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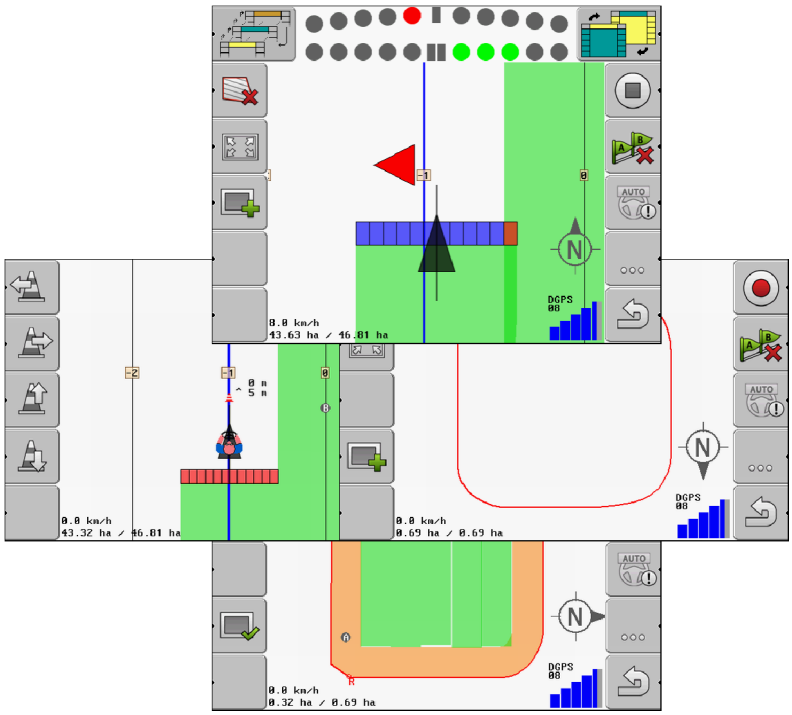
Operating Instructions

TRACK-Leader



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Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Imprint

Document

Operating Instructions
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1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Read the operating instructions for the agricultural device which you want to control by using the application.

1.2 Intended use

The software may be only used in connection with agricultural equipment and machines. The software may only be used away from public roads, during field operations.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

⚠ WARNING

This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

⚠ CAUTION

This signal word identifies low-risk hazards, which could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies actions which could lead to operational malfunctions if performed incorrectly.
These actions require that you operate in a precise and cautious manner in order to produce optimum work results.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. **NOTICE! This is a notice. It warns that there is a risk involved in the next step.**
2. Step involving risk.

1.4 User requirements

- Learn how to operate the terminal correctly. The terminal must not be operated by anyone who has not read the Operating Instructions.

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- Please read and carefully observe all safety instructions and warnings contained in these Operating Instructions and in the manuals of any connected vehicles and farm equipment.

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2 Operating procedures

2.1 When using parallel guidance only

1. Drive to the field.
2. Load field data. [➞ 46]
3. Deactivate the "SECTION-Control" parameter under "Settings" | "General". [➞ 63]
   - Select a machine profile. [➞ 77]
4. Prepare navigation. [➞ 26]
   - Select guidance mode. [➞ 27]
   - Set trace width. [➞ 26]
   - Set the interval of the guidance lines. [➞ 26]
5. Start navigation. [➞ 29]
6. Perform preparatory work.
   - Set reference point. [➞ 31] (Only when working with the cost-free DGPS signal.)
   - Mark field boundary [➞ 39] (optional).
   - Lay out AB line. [➞ 34]
7. Work.
   - Mark obstacles [➞ 43] (optional).
   - Apply product onto field [➞ 38] (optional).
8. Finish work.
   - Save field data in standard format. [➞ 46]

     or:
   - Export field data in GIS format. [➞ 47]

2.2 When using SECTION-Control

1. Drive to the field.
2. Load field data. [➞ 46]
3. Activate the "SECTION-Control" parameter under "Settings" | "General". [➞ 63]
4. Load prescription map (optional). [➞ 51]
5. Prepare navigation. [➞ 26]
   - Select guidance mode. [➞ 27]
   - Set trace width. [➞ 26]

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– Set the interval of the guidance lines. [➞ 26]

6. Perform preparatory work.
   – Start navigation. [➞ 29]
   – Set reference point. [➞ 31] (Only when working with the cost-free DGPS signal.)
7. Work.
   – Mark obstacles [➞ 43] (optional).
8. Finish work.
   – Save field data in standard format. [➞ 46]

   or:

   – Export field data in GIS format. [➞ 47]

2.3 When using the task management ISOBUS-TC

If you plan your ISO-XML tasks with the help of a Farm Management Information System (FMIS) on a PC and then want to work with the display, you will need to use the ISOBUS-TC application for this.

In this case, you must not save data in the TRACK-Leader application. All information generated while working will be transferred directly to ISOBUS-TC and saved in the file with the task.

Start work

Procedure

This is how you start work when using ISOBUS-TC:

1. Call up the ISOBUS-TC application.
2. Start the task.
   ⇨ TRACK-Leader will be displayed on the screen.
3. Use TRACK-Leader or SECTION-Control.

Finish work

Procedure

This is how you finish work when using ISOBUS-TC:

1. Call up the ISOBUS-TC application.
2. Finish the task.
3. or - Save data on the USB memory device or upload it to the FarmPilot portal.
   ⇨ All field data generated during work with TRACK-Leader will be stored in the "Taskdata.xml" file.

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3 About these Operating Instructions

3.1 Applicability

These Operating Instructions apply to all modules of the TRACK-Leader application from Müller-Elektronik.

You can find the software version from which these Operating Instructions apply in the Imprint.

3.2 Target group of these Operating Instructions

These Operating Instructions apply to all users of the TRACK-Leader software and related additional modules.

3.3 Layout of operating instructions

The operating instructions explain step by step how you can perform certain operations with the product.

We use the following symbols throughout these Operating Instructions to identify different operating instructions:

Type of depiction	Meaning
1. **2.**	Actions that must be performed in succession.
⇨	Result of the action. This will happen when you perform an action.
⇨	Result of an operating instruction. This will happen when you have completed all steps.
☑	Requirements. In the event that any requirements have been specified, these must be met before an action can be performed.

3.4 Layout of references

If any references are given in these Operating Instructions, they will appear as:

Example of a reference: [➞ 10]

References can be identified by their square brackets and an arrow. The number following the arrow shows you on what page the chapter starts where you can find further information.

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4 Product description

TRACK-Leader is a modern system enabling drivers of agricultural vehicles to keep exact lanes in the field.

The system has a modular design, so that the user can add further functions.

4.1 Performance description

Available functions of the software are subject to a license purchased for the modules.

There are two module types:

- Basis module: Prerequisite for additional modules.
  - TRACK-Leader
- Additional modules: can be combined as required.
  - SECTION-Control
  - TRACK-Leader TOP
  - VARIABLE RATE-Control

4.1.1 TRACK-Leader

Module type: Basic module. This is the prerequisite for all other modules.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.

To learn how to activate plug ins and licenses, read the installation and operating instructions to the terminal.

Functions

The following functions will be available after activation:

- Display of parallel guidance lines.
- Display of parallel guidance lines in headland.
- Marking of obstacles located in the field.
- Warning of obstacles marked.
- Warning of reaching a field boundary.
- Saving of work results in two formats.
- SECTION-View – display of sections which the driver must switch on and off by hand to avoid overlaps.

4.1.2 SECTION-Control

Module type: Additional module.

With SECTION-Control you can specify for any connected job computer what parts of the agricultural device it shall switch off, so that you avoid overlaps. This can be for example sections when working with a sprayer.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.
- License "SECTION-Control" must be unlocked.

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- The terminal must be connected to an ISOBUS job computer supported by SECTION-Control or to an SC-Box from Müller-Elektronik.
- The ISOBUS job computer must be configured.

Functions

The following functions will be available after activation:

- GPS-supported section-control.

4.1.3 TRACK-Leader TOP

Module type: Additional module.

With TRACK-Leader TOP you can specify how a Reichhardt steering job computer shall steer the vehicle, so that it follows the guidance lines set up through TRACK-Leader.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.
- License "TRACK-Leader TOP" must be unlocked.
- A steering job computer must be fitted, installed and configured on the tractor.
  - TRACK-Leader TOP works with steering job computers of the Reichhardt company: Steering ECU PSR, from software version 02-148
- Support for TRACK-Leader TOP must be activated on the steering job computer.

Functions

The following functions will be available after activation:

- Automatic steering of vehicle along defined guidance lines.

4.1.4 VARIABLE RATE-Control

Module type: Additional module.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "VARIABLE RATE-Control" must be unlocked.

Functions

With "VARIABLE RATE-Control" you can:

- Import prescription maps in shp format.
- Transfer target values from prescription maps to a job computer.

4.2 Using test licenses

When ready for delivery, a 50-hour test license is activated for all additional modules.

You can test each module for 50 hours. The time starts running only when you have activated a module.

After 50 hours have passed, all functions for which the test license has expired will be deactivated.

Procedure

This is how you can check how long you can use a test license:

1. Open the starting screen of TRACK-Leader.
2. Press the "Information" button:

⇨ The "Info" screen will appear.

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3. In the table you can see for how many hours you can still use a test license.

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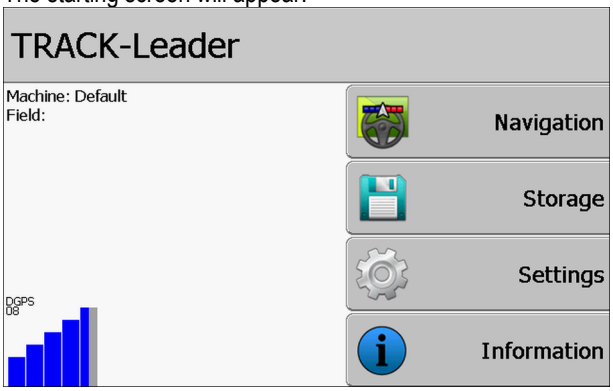
5 Basic control principles

5.1 Initial start-up

Procedure

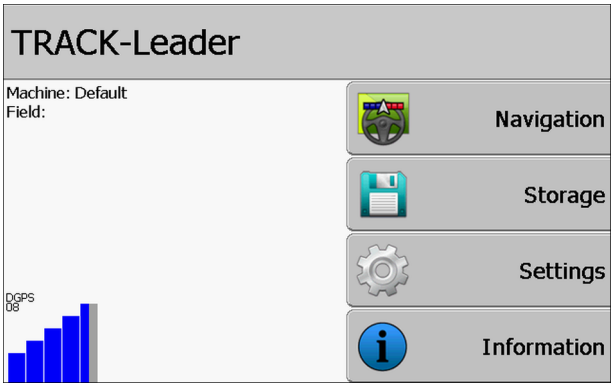
1. - Switch on the terminal.
2. Wait until all applications and job computers have been loaded.
3. - Open the "Selection menu" application.
4. Select "TRACK-Leader".
   ⇨ The starting screen will appear:



   ⇨ You have now started TRACK-Leader.
5. Read now how to configure TRACK Leader. [➞ 62]

5.2 Start screen layout

The Start screen appears when you launch the application.



TRACK-Leader Start screen

The Start screen allows you to:

- Switch to further screens.
- Read the status of the GPS signal.
- View the activated machine profile.
- View the name of the field currently being treated.

Controls

Function icon	Function
Navigation	Opens the preparation screen. From here you can: ▪ Starting a new navigation [➞ 29]

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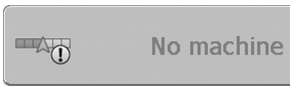
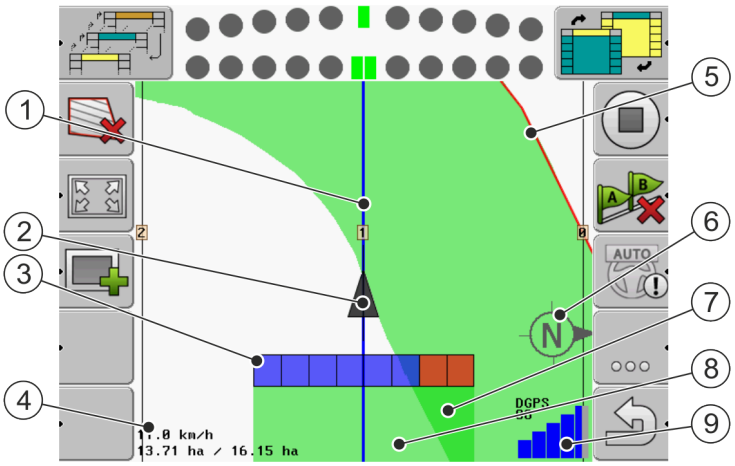
Function icon	Function
	▪ Continuing a started navigation [→ 29] ▪ Selecting guidance mode [→ 27]
	Appears instead of the "Navigation" function button if navigation with SECTION-Control is not possible. Possible causes: ▪ SECTION-Control is activated [→ 63], but no ISOBUS job computer is connected. ▪ Test license has expired. ▪ You are working without ISO-XML tasks, but the parameter "Work with ISO-XML?" is activated in the ISOBUS-TC application. Read more in chapter: Cooperation with the ISOBUS-TC application [→ 60] ▪ You are working with ISO-XML tasks and have not started a task. ▪ You have connected the terminal to a new ISOBUS job computer without re-starting the terminal.
	Opens the "Storage" screen. [→ 46]
	Opens the "Settings" screen. [→ 62]
	Opens the "Info" screen.

5.3 Structure of work screen

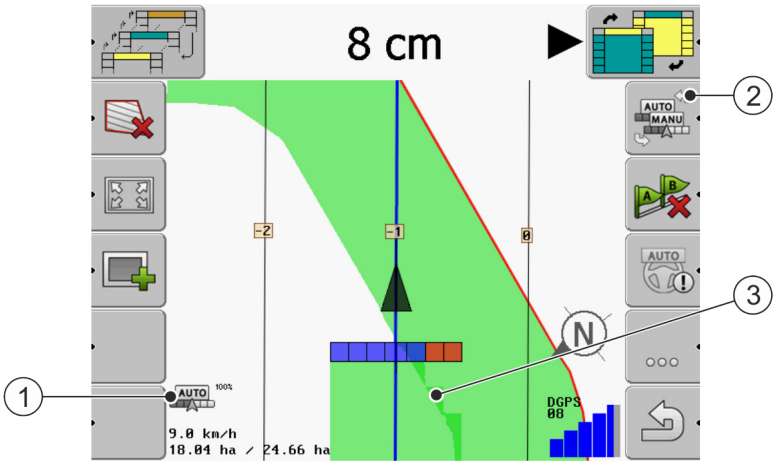
The work screen is what is displayed when navigation is started. [→ 29]

The information shown on the work screen varies depending on whether the SECTION-Control [→ 63] parameter is set to "yes" or "no".



Work screen when SECTION-Control is deactivated

1	Guidance lines	5	Field boundary
2	Position of GPS receiver	6	Compass
3	Working bar	7	Traveled areas and areas where the product has been applied twice
4	Counter and status information	8	Traveled areas and areas where the product has been applied
		9	GPS connection status



Change in screen when SECTION-Control is activated

1	Counter and status information	3	The dark color shows only areas applied twice
2	Function icon for changing the working mode		

Guidance lines

Guidance lines are lines which help the driver keep parallel tracks.

There are three types of guidance line:

- AB line - This is the first guidance line. This is always marked on the terminal screen with the letters A and B.
- Activated guidance line – this is the guidance line which the vehicle just follows. It is marked in blue.
- Not activated guidance lines – guidance lines not activated.

Position of GPS receiver

The position of the GPS receiver is marked with a black arrow on the screen.

Working bar

The working bar symbolizes the agricultural implement. This consists of multiple rectangles. Each rectangle corresponds to a section. The color of the rectangle can change while working.

See also: Using SECTION-View [➞ 24]

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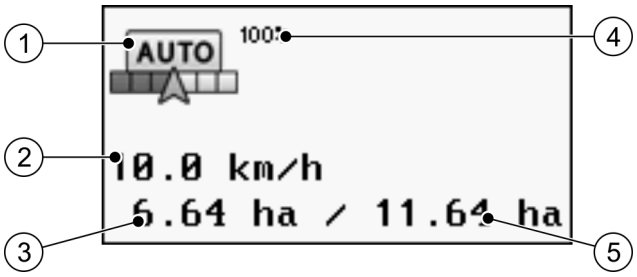
Counter and status information



Information in counter area

1	Working mode of SECTION-Control	4	Defined degree of overlap
2	Current speed The speed is tracked based on the GPS position and can differ from that in the job computer.	5	Total size of the field within field boundaries. Only if you have marked the field boundary.
3	Area counter - Area where the product is still to be applied if you have marked the field boundary. - Area where the product has been already applied if you have not marked any field boundary.		

Field boundary

The field boundary shows the exact position of the field to the software and is the base for calculating the total size of a field.

Compass

Shows where the north is.

Traveled areas and areas where the product has been applied

The surfaces to the rear of the vehicle icon are marked in green. This green color can have any of the following meanings, depending on the configuration:

- Traveled areas
  If you are only using TRACK-Leader, the traveled surface is marked. This is marked regardless of whether or not the vehicle applied product during this travel.
- Areas where product has been applied
  If you are using SECTION-Control, the surfaces where the product has been applied are marked. Surfaces over which the vehicle travels but where no product has been applied are therefore not marked.

If you want the software only to mark surfaces where the product has been applied in green, proceed as follows:

- Activate SECTION-Control

or

- Mount and activate the tool operating position sensor
  The tool operating position sensor recognizes that an agricultural device is in the operating position, and transmits this information to the terminal.

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GPS connection status

Shows the status of the DGPS connection.

See also: Checking the DGPS signal quality [➞ 34]

5.4 Controls

This chapter will provide you with an overview of most of the function icons which appear in the application, as well as their function.

Each icon has a pictorial representation of what happens when you press the button beside the function icon.

In the table you can find two columns with function icons:

- Function icon – shows the function icon in the current software on new terminals.
- Alternative function icon – shows the function icon in the past software version and on older terminals.

The function of both function icons is the same.

TRACK-Leader and SECTION-Control function icons

Function icon	Alternative function icon	Chapter with more information	Effects
		Marking the field boundary [➞ 39]	A red line drawn around the field is now shown on the navigation screen. This is the field boundary.
		Deleting a field boundary [➞ 40]	The field boundary will be deleted.
		Starting track recording [➞ 38]	Function icons appear only when SECTION-Control is deactivated and you have no tool operating position sensor.
		Changing the work screen [➞ 24]	The whole field will be displayed.
			Vehicle surroundings will be displayed.
		Changing working mode of SECTION-Control [➞ 38]	SECTION-Control will change the working mode.
		Laying out the AB line The exact appearance of the flags will	Point A of the A-B line will be set.

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Function icon	Alternative function icon	Chapter with more information	Effects
		depend on the guidance mode which has been activated.	
		Deleting guidance lines [➞ 37] Press the function button for three seconds.	Guidance lines will be deleted.
		Show next guidance line set.	
		Setting a reference point [➞ 31]	There are two possible consequences: - "GPS Calibration" screen will be called up. - Reference point will be set.
		Calibrating GPS signal [➞ 32]	There are two possible consequences: - "GPS Calibration" screen will be called up. - The GPS signal will be calibrated.
		Moving guidance lines [➞ 37]	Guidance lines will be shifted to the current position of the vehicle.
		Changing the work screen [➞ 24]	3D view will be activated
		Changing the work screen [➞ 24]	2D view will be activated
		Display other function icons	

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Function icon	Alternative function icon	Chapter with more information	Effects
		Loading field data [→ 46]	
		Saving field data [→ 46]	
		Viewing recorded tracks [→ 49]	
		Importing field data from GIS [→ 47]	
		Exporting field data for GIS [→ 47]	

In the headland

Function icon	Alternative function icon	The software is in this state when the icon appears	This happens when you press the function key next to the icon
		The field boundary has not been recorded.	Cannot be pressed.
		Headland is not activated. First appears when the field boundary has been marked.	Calls up a menu in which you can define the headland.
		You can now apply the product inside the field. SECTION-Control only applies product in the interior of the field. Sections will be switched off when passing over to a headland. Parallel navigation within the field is activated.	Guidance lines are displayed in the headland.

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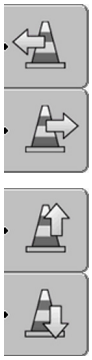
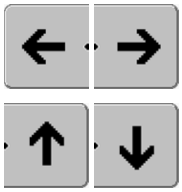
Function icon	Alternative function icon	The software is in this state when the icon appears	This happens when you press the function key next to the icon
		Now you can apply the product to the headland.	Parallel navigation within the field will be activated. Hold down the function button for three seconds in order to delete the headland.

TRACK-Leader TOP

The following function icons display on the work screen when TRACK-Leader TOP automatic steering is deactivated. You can read about what information appears when "TRACK-Leader TOP" is activated in chapter: TRACK-Leader TOP automatic steering [→ 56].

Function icon	Alternati-ve func-tion icon	Function
		TRACK-Leader TOP automatic steering is deactivated or unavailable.
		Steer vehicle to the left. The function key does not operate when TRACK-Leader TOP is deactivated.
		Steer vehicle to the right. The function key does not operate when TRACK-Leader TOP is deactivated.

Obstacles

Function icon	Alternative func-tion icon	Chapter with more information	Effects
		Marking obstacles [→ 43]	Screen with obstacle marking appears.
			Obstacle will be shifted.

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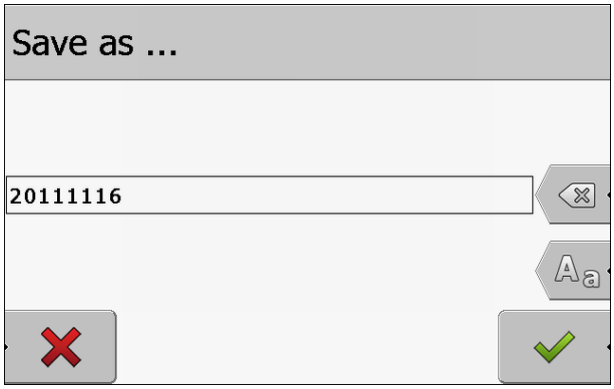
Function icon	Alternative function icon	Chapter with more information	Effects
			Obstacle will be placed in selected position.

5.5 Inputting data

The data input screen is used to input data.



The data input screen when saving

Controls

Function icon	Function
	Delete character
	Switch between upper and lower case
	Cancel input
	Confirm input

Procedure

1. - Select the desired characters.
2. - Transfer the desired characters.
   ⇨ The characters have been applied. The cursor shifts one position forward.
3. Input further characters.
4. - Once you have entered all of the characters, confirm the input.

5.6 Using the screen light bar

The screen light bar is provided in order to help the driver to follow the guidance line. This indicates to the driver when he has moved off the track and also once he has returned to the track.

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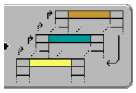
The following types of screen light bars are available:

- The screen light bar in graphic mode
- The screen light bar in text mode
- SECTION-View

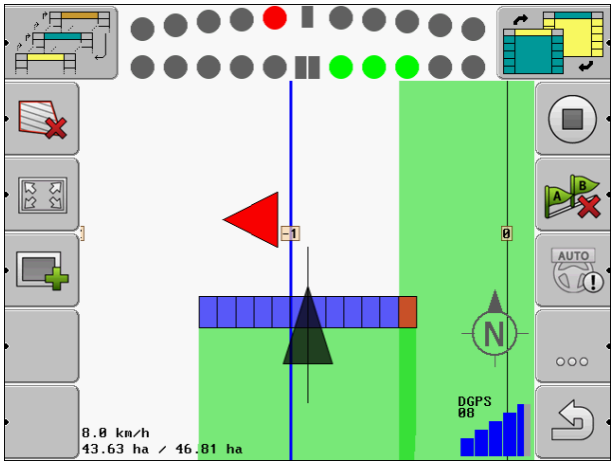
In addition to the screen light bar, a direction arrow appears on the screen, which indicates the correct steering direction.

Procedure

To enable the screen light bar:

1.  - Press repeatedly until the screen light bar appears in the header of the screen.

5.6.1 The screen light bar in graphic mode



Screen light bar – graphic mode

The screen light bar in graphic mode consists of two bars:

- The current deviation from the guidance line is displayed in the lower bar.
- The deviation is displayed at a specific distance in the upper bar. See the "Preview [➞ 65]" parameter.

Each circle indicates a specific deviation in centimeters. See the "Sensitivity [➞ 64]" parameter.

As the angle of travel can vary for technical reasons, the sensitivity value is doubled for display in the preview bar.

When steering, the aim should be to ensure that the central squares remain lit.

5.6.2 The screen light bar in text mode

In text mode, the screen light bar indicates how many meters you are from the guidance line. This also indicates the direction which you must steer in order to return to the trace. There is no preview in text mode.

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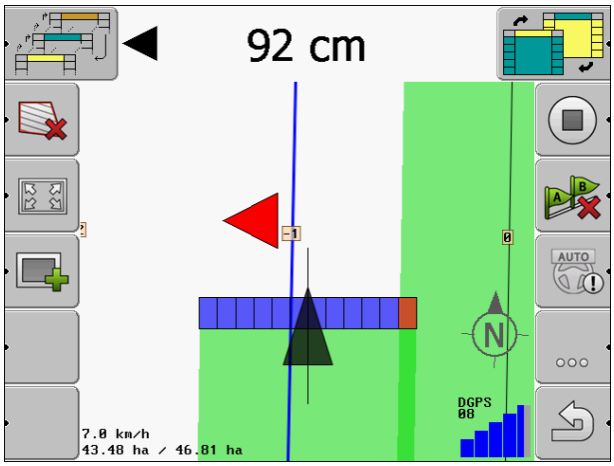
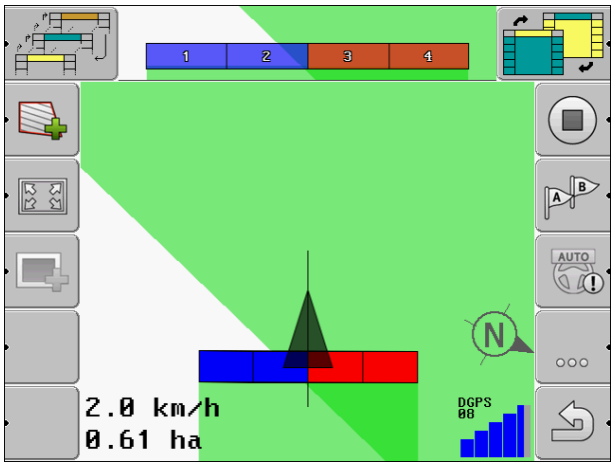


Screen light bar – text mode

5.6.3 Using SECTION-View

SECTION-View is a schematic display of the work width and the sections. This displays the vehicle as an icon and can replace the screen light bar.



SECTION-View in the header and as a working bar

If you are working without an ISOBUS job computer, you can use the display to help you when switching sections. If you are working with an ISOBUS job computer, the sections are actuated automatically. The colors tell you their current status.

Color	You have to do:
gray	The recording is deactivated. Beneath the section, the field is now being worked, or the vehicle is stopped.
yellow	The recording is deactivated. The ground beneath the section is unworked.
red	Switch off the section. The recording is activated.
blue	Switch on the section. The recording is activated.

5.7 Changing the work screen

You can change the display of the work screen in several ways.

Controls

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Control element	Function
	Zoom in and out.
	Display the whole field.
	Display vehicle surroundings.
	Activate 3D view
	Activate 2D view.

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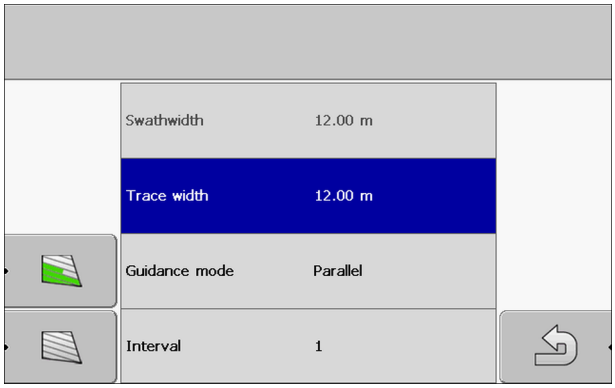
6 Preparing navigation

When you press the "Navigation" button on the Start screen, the so-called preparation screen will appear. You will need to set a number of parameters here



Preparation screen

Controls

Function icon	Meaning
	Starts a new navigation. The vehicle movements will be deleted.
	Continues to work on the field which is displayed on the "Storage" screen. The vehicle movements will not be deleted.

Parameter

Parameter	Explanation
Swathwidth	Will be taken from the connected ISOBUS job computer or a machine profile.
Trace width	Distance between guidance lines.
Guidance mode	See: Selecting guidance mode [→ 27]
Pattern interval	This parameter enables you to set the sequence at which the guidance lines are displayed in bold. This will make it easier for you to drive along each second or third track.
Spreading distance	Only appears for fertilizer applicators. See: Machine parameters [→ 82]
Working length	Only appears for fertilizer applicators. See: Machine parameters [→ 82]

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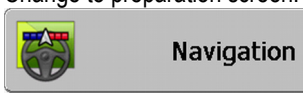
6.1 Selecting guidance mode

The guidance mode determines how the guidance lines are applied and how these run over the field.

Procedure

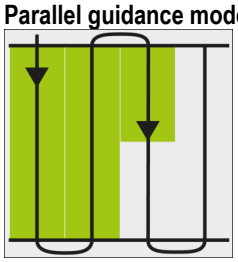
1. Change to preparation screen.



2. - Click on "Guidance mode".
3. - Select required guidance mode.
4. - Confirm input.

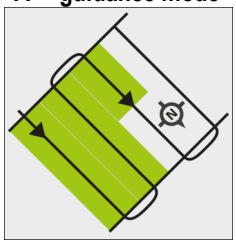
The following guidance modes are available:

- **Parallel guidance mode**



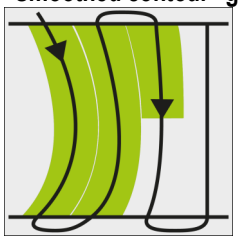
This guidance mode allows you to work the field in parallel, straight lines.

- **"A+" guidance mode**



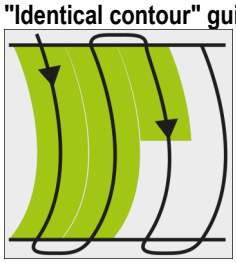
This guidance mode allows you to manually input the geographical direction in which the guidance lines should be laid. To do this, simply input the direction in degrees (between 0° and 360°), and the guidance lines are automatically laid, parallel to each other.

- **"Smoothed contour" guidance mode**



In "Smoothed contour" guidance mode, the the curvature of each guidance line curve is altered to straighten the guidance line as you move across the field. The guidance lines are straight in the direction of travel.

- **"Identical contour" guidance mode**



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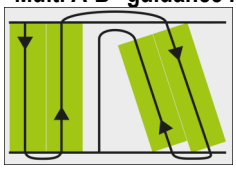
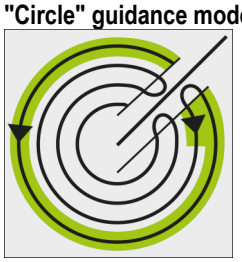
In identical contour guidance mode, there is no variation in the curvature. Only use this mode for gentle curves.
The disadvantage of this guidance mode is that the distance between the guidance lines will eventually become too large. It will then no longer be possible to apply the product onto the field accurately using the track-to-track process.
If you notice excessive distances between the guidance lines, delete the guidance lines and create a new A-B guidance line.

- **"Multi A-B" guidance mode**



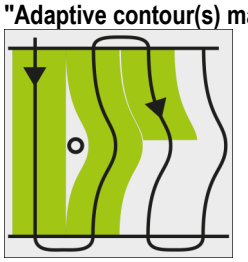
This guidance mode allows you to lay out up to five AB lines. For example, in order to be able to treat an L-shaped field.

- **"Multi smoothed contours" guidance mode**
  This guidance mode allows you to lay out up to five AB lines as smoothed contours.
- **"Circle" guidance mode**



This guidance mode allows you to lay out circular guidance lines in order to treat fields which are equipped with circular irrigation equipment.

- **"Adaptive contour(s) manual" guidance mode**



In this guidance mode, the path of the vehicle is recorded during each crossing. The next guidance line is only laid out after a turn. This will be an exact copy of the last crossing.
You must press a button before each turn.

- **"Adaptive contour(s) auto" guidance mode**
  This mode functions in the same way as "Adaptive contour(s) manual", but the terminal automatically recognizes that you are turning.

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7 Starting navigation

You have two options when starting navigation:

- Starting a new navigation
- Continuing a started navigation

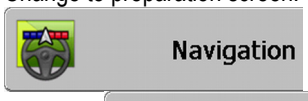
7.1 Starting a new navigation

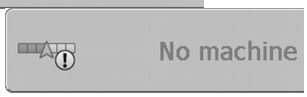
You can start a new navigation in the following cases:

- When you are working a field for the first time.
- When you load the field data for a known field. In this case, all old recorded tracks are deleted. You can however re-use the field boundaries, guidance lines and obstacles.

Procedure

1. Change to preparation screen.





⇨ If the icon appears instead, find out more here [➞ 14].

2. Set all of the displayed parameters. [➞ 26]

3. - Press.

⇨ The work screen appears.

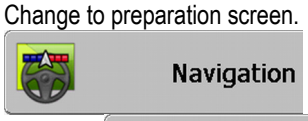
7.2 Continuing a started navigation

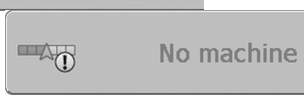
You can continue a navigation in the following cases:

- When you interrupted product application onto a field.
- When you exited the application.
- When you have loaded the data for a field.

Procedure

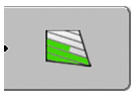
1. Change to preparation screen.





⇨ If the icon appears instead, find out more here [➞ 14].

2. Set all of the displayed parameters. [➞ 26]

3.  - Press.

⇨ The work screen appears.

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8 Operation while working

8.1 Calibrating DGPS

DGPS means "Differential Global Positioning System".

This system is used to determine the position of the vehicle.

Problem description

Throughout the course of the day, the Earth rotates and the satellites change their position in the sky. The calculated position of a point will as a result shift. This shift means that the position will after a certain time no longer be up-to-date.

This phenomenon is called a "drift", and can be minimized.

For your purposes, this means that all of the field boundaries and guidance lines which you create during a day will have shifted after a few hours.

Solution to the problem

There are two ways of compensating for the drift:

- Using Reference point – By setting a Reference point and calibrating the GPS signal each time before starting work. A free-of-charge way to use the A100 GPS antenna which provides an accuracy of up to +/- 30cm.
- By using a correction signal. A chargeable service provided by the GPS provider. Only for use in conjunction with a very accurate GPS antenna. The GPS signal must be re-calibrated automatically and at regular sequences. This enables an accuracy of less than five centimeters.

8.1.1 GPS with no correction signal

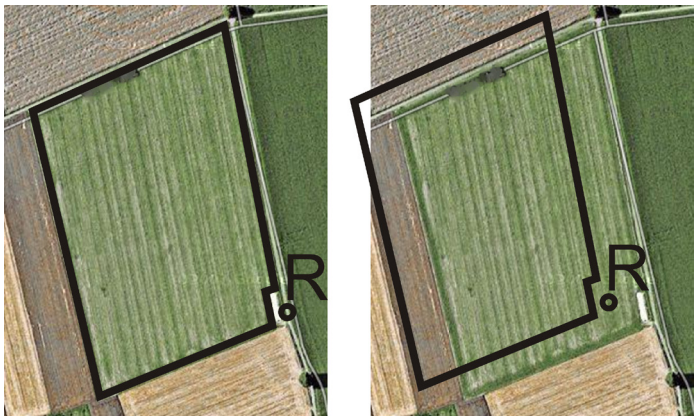
If your GPS does not use a correction signal, you will need to calibrate the GPS signal every time before starting work.

The more precisely you do this, the more precisely your system will operate. Conversely, the less precise the GPS calibration, the less precisely the system might be able to determine the position of the vehicle.

What do you need a reference point for?

A reference point will enable you to compare your actual GPS coordinates with the saved GPS coordinates and compensate for any drift (displacement).

A fixed permanent point on the ground is needed for calibrating the GPS signal. This is the so-called reference point. When the GPS signal is calibrated, the stored coordinates of the Reference point are compared and matched with the current coordinates.



Left – field with calibrated GPS signal; Right – field with no calibrated GPS signal

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If you do not set a reference point nor calibrate the GPS signal each time before starting work, the following will happen:

- The saved GPS coordinates for the field boundary, guidance lines, etc. will differ from the actual values.
- As a result, you may miss applying the product over areas in the field which are outside of the field boundaries according to the GPS.

In order to ensure maximum precision, you must:

- Set a reference point for each field and first product application.
- Calibrate the GPS signal before each product application.

Setting a reference point

Reference point – a point close to the field. This is used to compare the stored and actual position of the field.

The coordinates of the GPS antenna are crucial when setting the reference point.

When should this be set?

A reference point should be set in the following cases:

- When you are working a field for the first time.

Setting this correctly

When setting the reference point, you will require a fixed point whose position will not alter over time. This can for example be a tree, a landmark or a manhole cover.

This point is required in order to position the tractor in exactly the same position for future GPS signal calibrations.

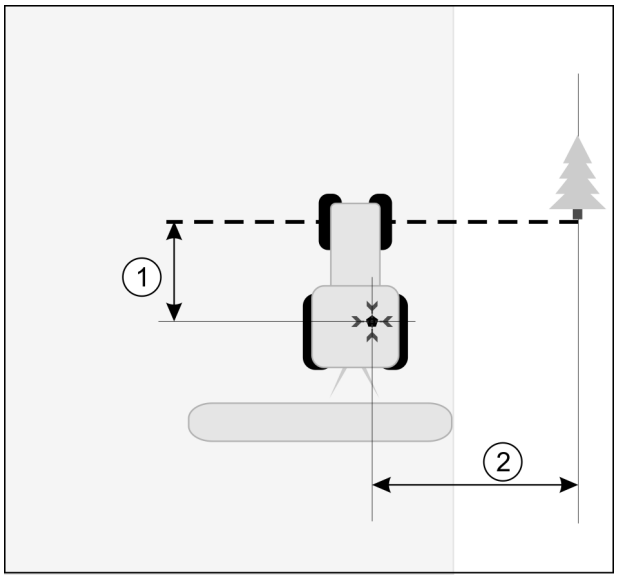
NOTICE

Data loss due to the lack of a reference point

If you are unable to locate the reference point in the future, the recorded data will be unusable.

- Always remember the precise position of the reference point for each field!

The illustration below shows a possible position of the tractor when setting the reference point:



Tractor when setting the reference point

•	GPS antenna on the roof of the tractor cab	✳	Position of the reference point
1	Distance between the GPS antenna and the Y-axis point on the roadside	2	Distance between the GPS antenna and the X-axis point on the roadside
– – –	Line from a fixed permanent point over the		

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	road		

Procedure

☑ When you are working a field for the first time.

1. Identify a fixed permanent point at the entrance to the field. This can for example be a tree, a landmark or a manhole cover.
2. Draw a line from the fixed permanent point over the road.
3. Position the tractor such that both its front wheels are on the line.
4. Note the distance between the point and the tractor.
   This distance must always be the same for future GPS calibrations.
5. Start a new navigation.
6. - Press.
7. - Press.
8. - Press.
   - ⇨ The program determines the current position over a period of 15 seconds, and saves this as reference point. The reference point must be set precisely at the position of the GPS antenna.
   - ⇨ Any existing reference points and signal calibrations are thus deleted.
   - ⇨ The work screen then displays the reference point icon beneath the vehicle icon:

⇨ You have now set the reference point.

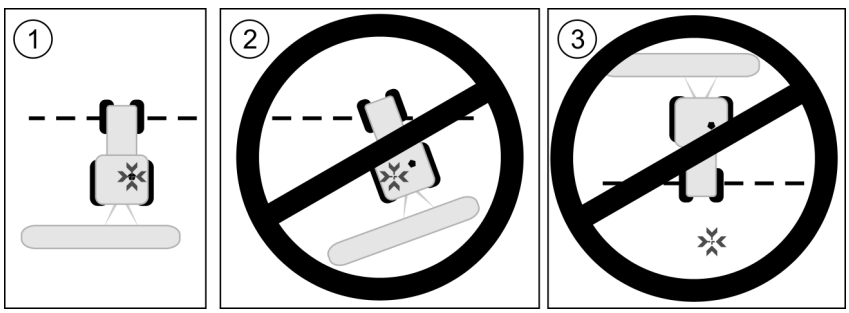
Deleting a reference point

Procedure

1. - Press down for three seconds.
   - ⇨ The reference point will be deleted.

Calibrating GPS signal

When calibrating the GPS signal, the GPS antenna must be in the exact same position as that when setting the Reference point.



Position of the GPS antenna in relation to the reference point when calibrating the GPS signal

✲	Position of the reference point
•	GPS antenna on the roof of the tractor cab

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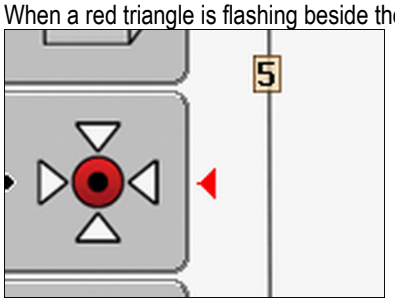
When should you calibrate?

You will need to calibrate the GPS signal in the following instances:

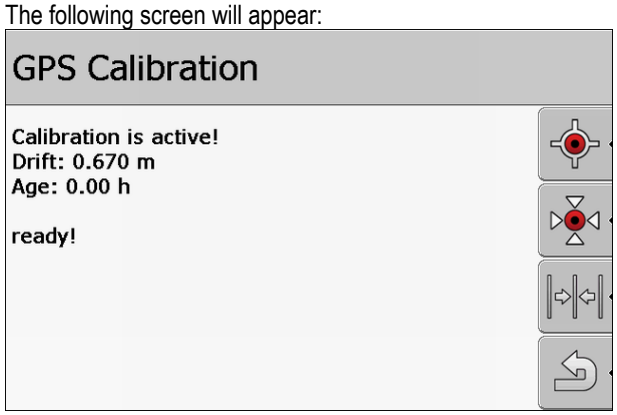
- Each time before starting work
- When a red triangle is flashing beside the function icon



- When you find that a deviation is shown on the screen even when driving down a swath.

Procedure

1. Drive to "Reference point" at the entrance to the field.
2. Position the tractor such that both its front wheels are on the line.
   The tractor must be positioned at the same angle as when the reference point was set. The distance from the fixed permanent point on the roadside must be the same as when the reference point was set.
3. - Press.
4. - Press.
5. - Press.
   ⇨ The program will need 15 seconds to determine the current position. Re-calibrating the reference point overwrites the old calibration.
   ⇨ The following screen will appear:



6. - Back.

The GPS calibration screen now displays the following parameters:

- Drift
  Displays the reference point drift since the reference point was set. All field data will be shifted by this value. Drift is re-calculated when the GPS signal is calibrated.
- Age

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How many hours have passed since the GPS signal was last calibrated. Hour segments are displayed in hundredths of a second behind the decimal point. For example: 0.25 h = quarter of an hour = 15 minutes

8.1.2 DGPS with correction signal

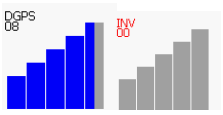
When using an RTK correction signal, you need neither set a reference point nor calibrate the GPS signal. The position of the tractor is continuously corrected by the RTK provider by means of a correction signal.

8.1.3 Checking the DGPS signal quality

The quality of the GPS signal can vary widely depending on your geographic position.

You can see the GPS signal quality on the following screens:

- on the start screen
- on the work screen



The DGPS connection indicator displays the following information:

- Bar chart
  Indicates the quality of the connection. The higher the number of blue bars, the better the connection.
- Number of connected satellites
- Correction signal status
  This status should always at least display "DGPS", in order to ensure sufficient accuracy. RTK systems will display either "RTK Fix" or "RTK Float".

SECTION-Control will switch to manual mode in the following cases:

- When the DGPS signal status is "GPS" or lower.
- When the number of satellites drops to less than four.
- The bar chart does not display anything.

This is shown by an alarm message on the screen.

You should manually activate automatic mode once the GPS connection improves.

8.2 Using guidance lines for parallel guidance

Guidance lines are parallel lines which are displayed on the terminal screen. These help you to treat the field in parallel lines.

The first guidance line which you lay out on the terminal is called the AB line. On the terminal screen, these are usually marked with the letters A and B. All further guidance lines will be calculated and designated on the basis of the AB line.

The path of the AB line will be saved after the first drive-over, which you must perform manually. The operation of the terminal will depend on the guidance mode that you have chosen.

8.2.1 Straight guidance lines

Procedure

☑ "Parallel" guidance mode is activated. [➞ 27]

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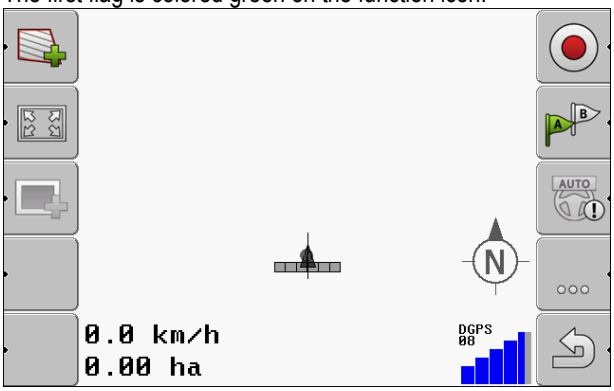
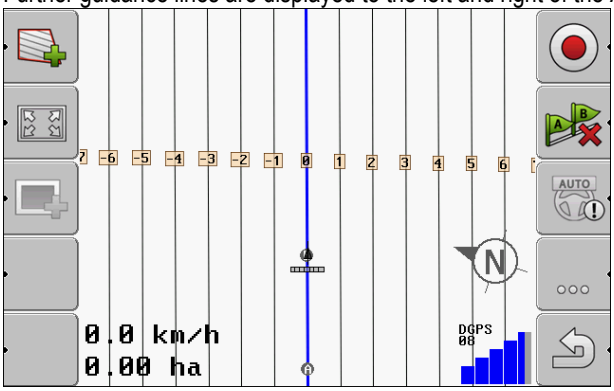
1. Position the vehicle at the starting point of the desired AB line.
2. - Set the first point.
   ⇨ Point A appears on the terminal screen.
   ⇨ The first flag is colored green on the function icon.
   ⇨ 

3. Drive to the other side of the field.
4. - Set the second point.
   ⇨ Point B appears on the terminal screen.
   ⇨ The second flag is colored green on the function icon.
   ⇨ Points A and B are connected with a line. This is the AB line.
   ⇨ Further guidance lines are displayed to the left and right of the AB line.
   ⇨ 

8.2.2 Guidance lines as a curve

Procedure

☑ "Smoothed contour" or "Identical contour" guidance mode is activated. [→ 27]

1. Position the vehicle at the starting point of the desired AB line.
2. - Set the first point.
   ⇨ Point A appears on the terminal screen.
3. Drive to the other side of the field. You do not need to drive in a straight line when you do this.
   ⇨ During the drive, a line will be drawn behind the vehicle on the terminal screen.
4. - Set the second point.
   ⇨ Point B appears on the terminal screen.

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⇨ Points A and B are connected with a line.

8.2.3 Guidance lines using a compass

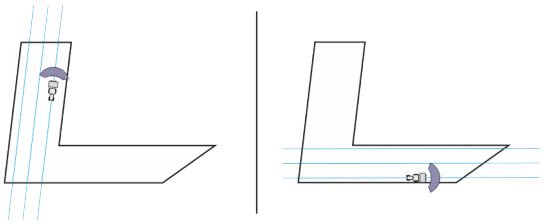
Procedure

☑ Guidance mode "A+" is activated.

1. Position the vehicle at the starting point of the desired AB line.
2. Press the function button:
   ⇨ The data input screen appears.
3. Input the direction of the compass that the guidance lines should point towards. You can input a value between 0° and 360°.
4. Confirm using "OK".
   ⇨ Multiple parallel guidance lines are drawn on the terminal screen, and these all run in the direction which you have entered.

8.2.4 Multiple guidance lines

If you need to change the direction of treatment several times in the field, you can lay out up to five AB lines.



A field which is to be treated using multiple guidance lines.

Procedure

☑ "Multi smoothed contours" or "Multi A-B" guidance mode is activated.

1. Lay out the first AB line. Make sure that the function icons which you are using for this purpose are labeled with a number between 1 and 5. This is the number of the guidance line set.
2. Apply the product to the field along these guidance lines.
3. - Change the guidance line set. The number of the next guidance line set is always shown on the function icon.
   ⇨ All guidance lines disappear.
   ⇨ A new number appears on the function icons.
4. - Now lay out a new AB line in any direction.
5. Apply the product to the field along these guidance lines.
6. If you press the function button again, the number on the function icon will be increased and you will be able to lay out a new AB line. If you do not lay out a new AB line, the existing AB lines will be displayed consecutively.

8.2.5 Guidance lines as circles

Procedure

☑ "Circle" guidance mode is activated.

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1. Position the vehicle at the outer edge of the field, next to the circular irrigation equipment.
2. - Set the first point.
3. Drive at least halfway around the circumference of the field.
4. - Set the second point.
   ⇨ Circular guidance lines appear on the terminal screen.

8.2.6 Adaptive guidance lines

Procedure

☑ "Adaptive contour(s) manual" or "Adaptive contour(s) auto" guidance mode is activated.

1. Position the vehicle at the starting point of the desired AB line.
2. or - Set the first point.
3. Drive to the other side of the field.
   ⇨ A line is drawn behind the arrow icon.
4. - Mark the turn maneuver in "Adaptive contour(s) manual" guidance mode.
5. Make a turn in "Adaptive contour(s) auto" guidance mode. The system will automatically recognize this.
   ⇨ New guidance lines appear to the left and right of the drawn line.
6. Follow the new guidance line.

8.2.7 Deleting guidance lines

You can delete guidance lines and create new ones at any time.

Procedure

1. Press any of the following function buttons for approx. 3 seconds: , . The icons can appear different depending on the guidance mode.
   ⇨ The guidance lines will be deleted.
   ⇨ In "Multi A-B" and "Multi smoothed contours" guidance modes, the guidance line sets are renumbered.

8.2.8 Moving guidance lines

Use this function if you are indeed on the desired line of travel but the position of the tractor is shown beside the track on the terminal.

This function only operates in the following guidance modes:

- Parallel
- Smoothed contour
- Identical contour

Procedure

☑ You have now started a navigation

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1. - Press.
2. - Keep pressed for three seconds to move the guidance lines to the current position.

⇨ The guidance line is then shifted.

8.3 Starting track recording

You do not need to read this Chapter if:
- SECTION-Control is activated
- You have a tool operating position sensor

If you do not use SECTION-Control or have not mounted any tool operating position sensor, the software will not know when your equipment (e.g. sprayer) is working and when it is not. You will therefore need to tell the software when you begin the task.

Recording the tracks enables you to see the parts of the field which you have already traveled through on the screen.

Procedure

☑ You have now started a navigation.

1. - Record movements.
   ⇨ The function icon changes its appearance:
   ⇨ A green track appears behind the tractor icon. It is marking your tracks.

8.4 Changing working mode of SECTION-Control

If SECTION-Control is activated, you can work in one of two modes:
- Automatic mode
- Manual mode

Controls

Switch between manual and automatic mode

Automatic mode

Automatic mode has the following features:
- Automatic section switching during overlaps

Manual mode

Manual mode has the following features:
- The equipment (e.g. the sprayer) must be manually switched. The results are recorded.

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8.5 Field boundary

8.5.1 Marking the field boundary

You must mark the field boundary for each new field.

You can mark this field boundary while applying the product in the headlands.

Depending on whether or not you are working with an RTK correction signal, you can:

- Possibility 1:
  Applicable in both cases.
  - Travel around the field.
  - You can calculate the field boundary along the green tracks which were created during this travel around the field.
  - Apply product in the interior of the field.
- Possibility 2:
  Recommended with RTK correction signal only.
  - Apply product in the interior of the field.
  - Travel around the field.
  - You can calculate the field boundary along the green tracks which were created during this travel around the field.

  This method also works without an RTK correction signal, although you will need to calibrate the GPS signal before applying the product and calculating the field boundary. This is because the GPS position drift occurs between the start of work and the calculation of the field boundary.

Procedure 1

If you first want to travel around the field, you should create the field boundaries as follows:

☑ You have set and calibrated "Reference point". (if you are working with no RTK correction signal)

1. Start a new navigation.
2. Turn on the towed or attached equipment.
3. - Press if this function icon appears on the screen.
   The function key is here to tell the software that you start working. If SECTION-Control is activated, or if you have mounted an operating position sensor, this function icon will not appear.
4. Start your route around the field.
   ⇨ After traveling a few centimeters, you will see that a green track is being left behind the device bar on the screen. This track marks the area where the product has been applied.
   ⇨ If no green track appears, this may be due to the following reasons:
   a) You did not start working on the tractor-mounted equipment (SECTION-Control)
   b) You forgot to press the function key (TRACK-Leader).
5. Drive around the entire field.
6. End the drive route at the starting point. The drive route must be a closed circuit.

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7. - Press as soon as you arrive back in the starting point.

⇨ A red line drawn around the field is now shown on the navigation screen. This is the field boundary.

Procedure 2

If you first want to apply the product in the field, you should create the field boundaries as follows:

☑ You must have an RTK correction signal available.

1. Start a new navigation.
2. Turn on the towed or attached equipment.
3. - Press when this function icon appears on the work screen.
   If SECTION-Control is activated, or if you have mounted a tool operating position sensor, you do not need to press this function key. This is provided for you to inform the software that you are going to start to work.
4. Start product application onto the field.
   ⇨ After traveling a few centimeters, you will see that a green track is being left behind the device bar on the screen. This track marks the area where the product has been applied.
   ⇨ If no green track appears, this may be due to the following reasons:
   a) You did not start working on the tractor-mounted equipment (SECTION-Control)
   b) You forgot to press the function key (TRACK-Leader).
5. Apply product onto the field.
6. After completing product application, travel around the field.
7. - Press as soon as you arrive back in the starting point.

⇨ A red line drawn around the field is now shown on the navigation screen. This is the field boundary.

8.5.2 Deleting a field boundary

Procedure

You can delete the field boundary as follows:

1. - Press down for three seconds.

⇨ The field boundary marked with red line will be deleted.

8.6 Working in headlands

In the headland you can lay out guidance lines which will guide you around the field.

Advantages:

- You can apply product in the headland after applying the product in the center of the field. In this way, no spray residue remains on the tires after product application in the headland.
- SECTION-Control switches off the boom sections which are in the headland area when the product is being applied onto the field.

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Restrictions:

- When working with headlands, the TRACK-Leader TOP automatic steering system cannot be used. The driver must steer the vehicle himself, manually.

Function icon	Alternative function icon	The software is in this state when the icon appears	This happens when you press the function key next to the icon
		The field boundary has not been recorded.	Cannot be pressed.
		Headland is not activated. First appears when the field boundary has been marked.	Calls up a menu in which you can define the headland.
		You can now apply the product inside the field. SECTION-Control only applies product in the interior of the field. Sections will be switched off when passing over to a headland. Parallel navigation within the field is activated.	Guidance lines are displayed in the headland.
		Now you can apply the product to the headland.	Parallel navigation within the field will be activated. Hold down the function button for three seconds in order to delete the headland.

Parameter

You must set the following parameters:

- "**Headland width**"
  Input here how wide the headland should be. You can input the work width of the widest machine as a basis, for example the sprayer.
- "**Guidance line distance**"
  Here, input how widely separated from each other the guidance lines should be. This normally corresponds to the work width of the used working equipment.
- "**Half-side mode**"
  Parameter for seeders only.
  Set the parameter to "yes" when you want to lay out guidance lines for the sprayer with the seeder and thus lay out both guidance lines in a single drive-over.

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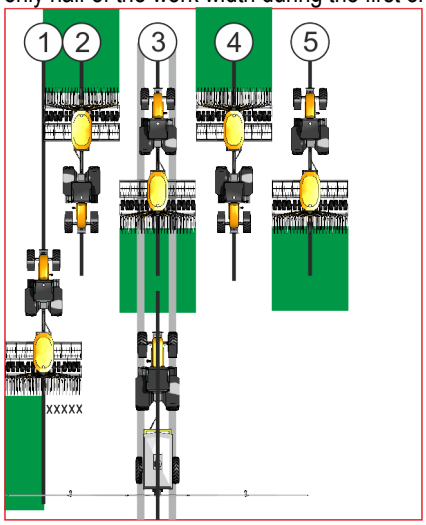
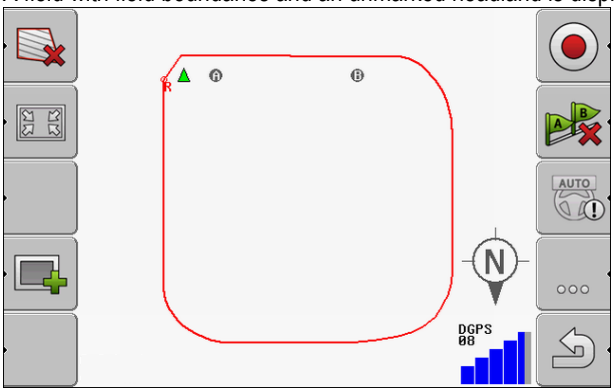
In this mode, the guidance lines are laid out in such a way that the seeder can only work with only half of the work width during the first or second driver-over.



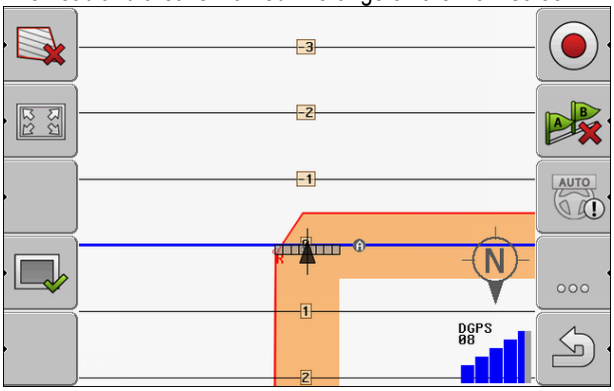
Procedure

☑ A field with field boundaries is loaded.

1. Start a new navigation.
   ⇨ A field with field boundaries and an unmarked headland is displayed.



2. - Call up the parameters for the headland.
   ⇨ The parameters are displayed.
3. Enter the parameters.
4. "OK" - Confirm the inputs.
   ⇨ The headland area is marked in orange on the work screen.



5. Apply product in the interior of the field.

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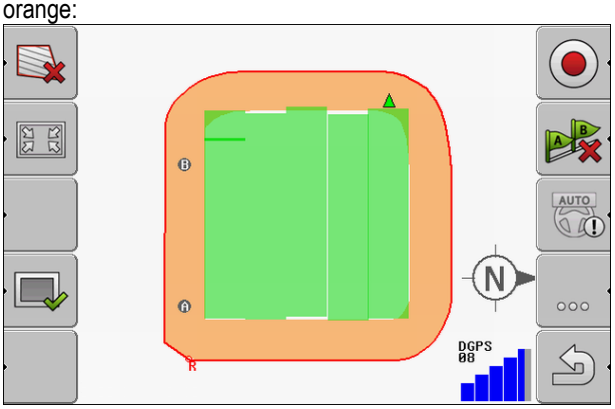
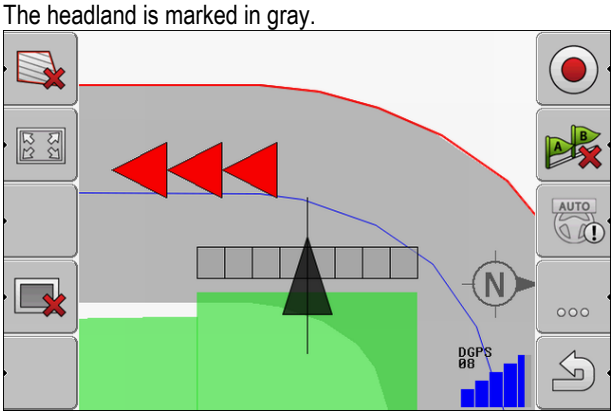
⇨ Once the product has been applied, the interior of the field is green and the headland orange:



6. - Activate parallel guidance in the headland.

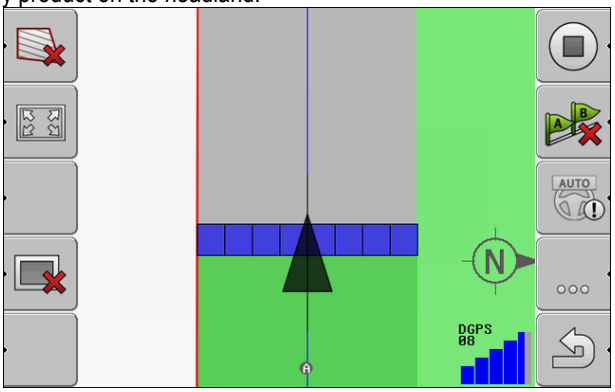
⇨ - is displayed in the work screen.

⇨ The headland is marked in gray.



⇨ Guidance lines are displayed in the headland.

7. Apply product on the headland.

⇨ 

8.7 Marking obstacles

When there are obstacles in your field, you can mark their position. In this way, you will always receive a warning before any collision can occur.

You can mark obstacles while working in a field.

You will be warned of an obstacle in the following cases:

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- If the obstacle will be reached in 20 seconds or less.
- If the distance between the obstacle and the vehicle is smaller than the work width of the agricultural device.

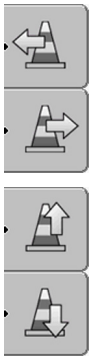
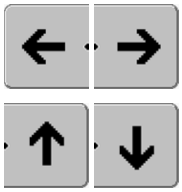
The warning always consists of two elements:

- A graphical warning in the upper left-hand corner of the work screen
  - "Field boundary"
  - "Obstacle"
- Acoustic signal

⚠ CAUTION

Obstacles
The software can warn you about obstacles. It cannot brake nor avoid the obstacles.

Obstacles

Function icon	Alternative function icon	Chapter with more information	Effects
		Marking obstacles [→ 43]	Screen with obstacle marking appears.
			Obstacle will be shifted.
			Obstacle will be placed in selected position.

Procedure

☑ You have now started a navigation.

1. - Press.
2. - Press.

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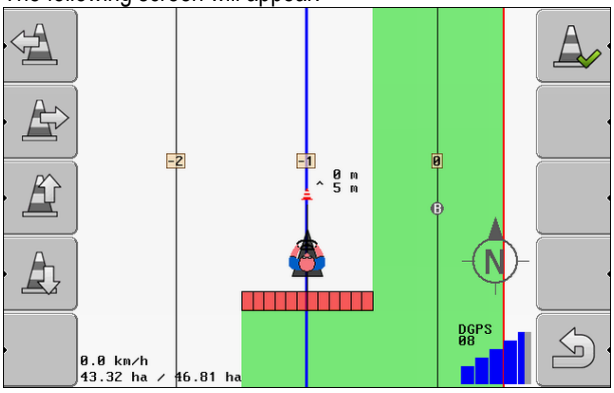
⇨ The following screen will appear:



The screen shows a schematic representation of vehicle with driver, obstacle and distance between obstacle and GPS receiver.

3. Set the distance between the obstacles and tractor point by using the arrows.
   As TRACK-Leader knows the position of the tractor, it can calculate the obstacle position in the field.
4. - Save obstacle position in the field.

⇨ The obstacle now appears on the work screen.

8.7.1 Deleting obstacle markers

Procedure

1. - Press down for three seconds.
   ⇨ All obstacles will be deleted.

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9 Using data from USB memory device

Field data can be saved for each field on which you work.

Field data consists of the following information:

- Field boundaries
- Reference point
- Guidance lines
- Recorded tracks
- Marked obstacles

All field data will be saved together on the USB memory device.

9.1 Saving and loading field data

If you save the field data created during product application to the USB memory device, you can use this with other applications.

For example with:

- ISOBUS-TC
- FIELD-Nav
- FIELD-Nav desktop
- TRACK-Guide Desktop
  You can download the application free of charge.

9.1.1 Saving field data

Procedure

1. Switch to the "Storage" screen.

   ⇨ The main area shows you the currently loaded and/or treated field.
2. - Press.
   ⇨ The data input screen appears.
3. Enter a name under which the field data shall be saved.
   ⇨ The data is saved in the "ngstore" folder on the USB memory device.
   ⇨ The field will be deleted from the Overview.
4. If you want to continue to treat the field directly, you will need to load this.

9.1.2 Loading field data

Always load the field data before working on a field where the product has been already applied.

Procedure

1. Switch to the "Storage" screen.

2. - Press.
   ⇨ The "Load record" screen will appear.

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3. - Click on required field.

⇨ An overview of the field will appear on the "Storage" screen.

9.1.3 Discarding field data

When discarding field data, all information in the temporary memory of the terminal is deleted.

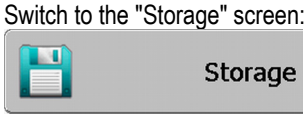
You must delete the field data for a field after product application in order to be able to work on a new field. If you do not do this, the software will assume that you want to apply the product onto the first field once again.

NOTICE

Data loss
Once field data is discarded, it cannot be retrieved.

- Save all important field data before discarding this.

Procedure

1. Switch to the "Storage" screen:


2. - Press.

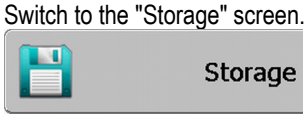
⇨ The field data for the currently loaded field are discarded.

9.2 Exporting and importing field data for GIS

If you document your work in GIS format, you can open and process the field data in a GIS program on your PC.

9.2.1 Exporting field data for GIS

Procedure

1. Switch to the "Storage" screen.


2. - Press.
   ⇨ The data input screen appears.
3. Enter a name under which the field data shall be exported.

⇨ The data is saved in the "**NavGuideExport**" folder on the USB memory device.

9.2.2 Importing field data from GIS

Types of GIS field data

- Background surfaces
- Obstacle lines
- Obstacle points

Procedure

☑ You have created the directory "**NavGuideGisImport**" on the USB memory device.

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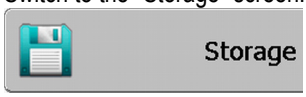
☑ All of the data which you want to import are in the "**NavGuideGisImport**" folder on the USB memory device. The folder must have no sub-folders.

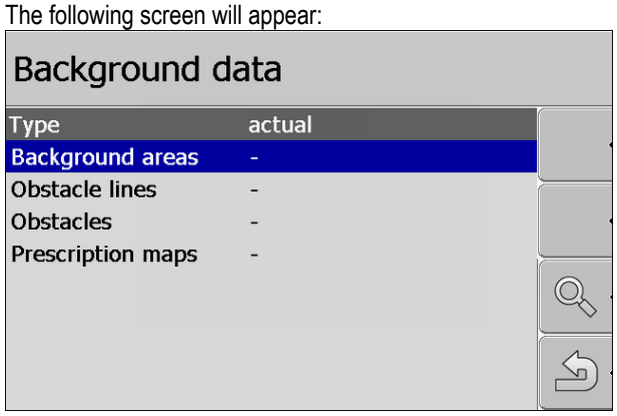
☑ The data to be imported are in format WGS84.

1. Switch to the "Storage" screen.



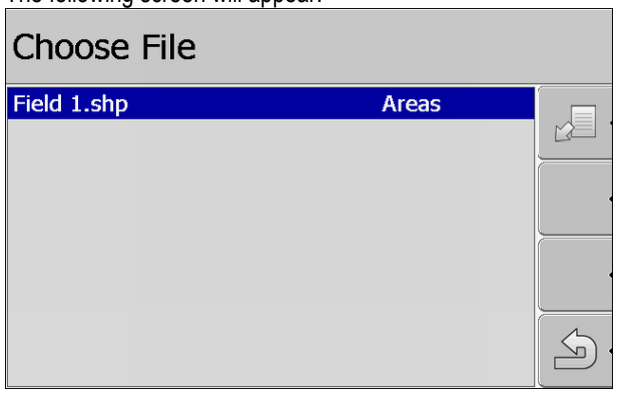
2. - Press.

⇨ The following screen will appear:



3. Click on the desired GIS field data type.

⇨ The following screen will appear:



The left column shows the names of the files containing the field data. The right column shows the GIS field data types. The naming of the files will depend on you, and the way in which you use the GIS system.

4. Mark the line containing the required data.

5. - Press.

⇨ The background data is loaded.

9.3 Reorganizing data

The aim of reorganizing your data is to speed up the operation of the terminal.

The data saved on the USB memory device are sorted so that the terminal can access this data more rapidly.

Procedure

1. Switch to the "Storage" screen.

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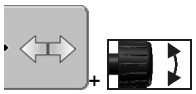
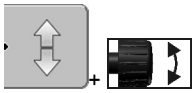
2. - Press.
   ⇨ The "Load record" screen will appear.
3. - Press.
   ⇨ The "data administration" screen will appear.
4. - Click on "data rearrangement".
5. The following message will appear: "Ready".
6. - Confirm.

9.4 Viewing recorded tracks

You can view and check the recorded tracks to see if you have left anything out.

Controls

Function icon	Meaning
	Move the cursor left and right
	Move the cursor up and down
	Zoom

Procedure

1. Switch to the "Storage" screen
2. Load the desired field.
3. - Zoom.
4. or - Continue pressing the function key.
5. - Turn the rotary button.
   ⇨ The selection is then shifted.

9.5 Deleting fields from the USB memory device

You can delete entire fields with all related field data from the USB memory device.

Procedure

You can delete a field as follows:

1. Switch to the "Storage" screen.
2. - Press.
   ⇨ The "Load record" screen will appear.

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3. - Mark the file with the field to be deleted.
4. - Delete marked file.
   ⇨ The following message will appear: "Really delete this record?::"
5. - Confirm.

⇨ The name of the file containing the field data is removed from the table.

9.6 Deleting recorded tracks

You can delete the recorded tracks for all saved fields. The other field data [➞ 46] will not be deleted.

You can perform this step at the end of the season, for example.

Procedure

1. Switch to the "Storage" screen.
2. - Press.
   ⇨ The "Load record" screen will appear.
3. - Mark required field.
4. - Press.
5. The "data administration" screen will appear.
6. - Click on "delete recorded tracks".
   ⇨ The following message will appear: "All recorded tracks will be deleted! Continue?"
7. - Confirm.

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10 Editing prescription maps with VARIABLE-RATE Control

A prescription map is a detailed map of a field. In this map the field is split up into areas. The prescription map contains information on how intense the work in each area shall be.

Mode of operation

When the prescription map has been loaded, the software checks via GPS coordinates of the vehicle what application rates are needed according to the prescription map and transfers this information to the ISOBUS job computer.

10.1 Basic processes

To be able to work with prescription maps in *.shp format, you need to:

1. Set up a prescription map on the PC.
2. Copy the prescription map to the USB memory device.
3. Import the corresponding prescription map by using TRACK-Leader.
4. Select a format for the prescription map.
5. Adjust the prescription map to current needs.

In the chapters below you will learn how to take these steps.

10.2 Creating prescription maps

You can create a prescription map in the Farm Management Information System or by using other PC programs.

Each prescription map must be compiled from the following files:

- Shp
- Dbf
- Shx

10.3 Copying prescription maps to the USB memory device

Copy all prescription maps to folder "applicationmaps" on the USB memory device.

10.4 Importing prescription maps

You can import a prescription map created on the PC from the USB memory device.

Import the prescription map before starting your work.

Procedure

☑ You have created the directory "**applicationmaps**" on the USB memory device.

☑ All prescription maps you want to import are stored on the USB memory device in folder "applicationmaps".

1. Switch to the "Storage" screen:
Storage

2. - Press.
⇨ The "Background data" screen will appear.

3. Click on line "Prescription maps".

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⇨ The "Prescription maps" screen will appear.

4. - Press.
   ⇨ The "Choose prescription map" screen will appear.
5. Click on the line with the name of the prescription map you want to import.
   ⇨ TRACK-leader will check whether recognizes the file format.
   ⇨ If the format is not recognized, you have to create a new format. Read how to do so in the following chapter: Creating new prescription map formats [→ 52]
   ⇨ When the format is recognized, the following screen will appear: "Choose format".
   ⇨ The format selected by the software appears in line "Format".
6. Press "OK“ to load the prescription map with this format.
7. Press "New" to load the prescription map with a new format.

10.5 Prescription map format

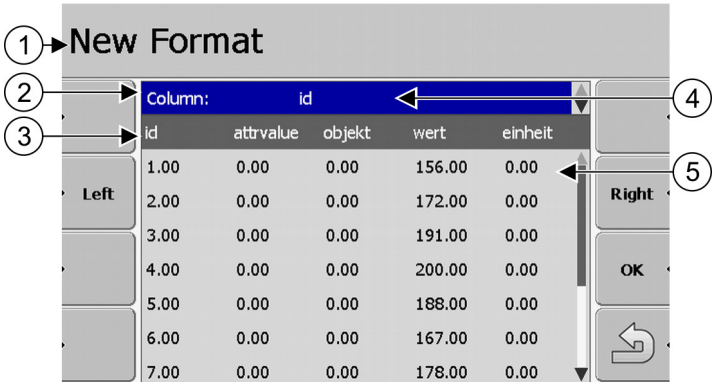
Each prescription map is structured like a table.

The "format" function tells the TRACK-Leader software in which column of the prescription map the values, used later as the "Rate" for the work, are located.

10.5.1 Creating new prescription map formats

You need to create a new format when importing a prescription map with a structure not recognized by the software.

The formats will be stored directly in internal storage of the terminal. You have to create them separately for each terminal.



Screen "New Format"

1	Screen name	4	Denotation of selected column
2	Box for column selection	5	Data in the table Data come from the shp file
3	Table headlines Column headlines are defined when creating the prescription map with the PC software.		

Controls

Control element	Function
	Select column name

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Control element	Function
Left	Scroll to the left if the table is bigger than the screen.
Right	Scroll to the right if the table is bigger than the screen.
OK	Confirm your choice

Procedure

This is how you create a new format for the prescription map.

☑ You have chosen a prescription map.

☑ The "Choose format" screen has been called up.

1. Press "New".
   ⇨ The following screen will appear: "New Format"
2. In the "Column" line, choose the denotation of the column containing required values.
3. Press "OK“ to confirm the choice.
   ⇨ The following screen will appear: "Format name"
4. Enter the name of the new format.
   ⇨ The following screen will appear: "Unit"
5. Choose the unit containing the values in the prescription map.
6. Press "OK".
   ⇨ The following screen will appear: "Choose format".
   ⇨ The name of the new format appears in line "Format".
7. Press "OK".
   ⇨ The prescription map will be loaded. This process can take a bit longer if the prescription map is large.

⇨ The following screen will appear: "Prescription maps"

10.5.2 Selecting from prescription map formats

Procedure

This is how you select an available prescription map format:

☑ You have chosen a prescription map.

☑ The "Choose format" screen has been called up.

1. Press "Format".
   ⇨ The "Format" line will be marked in blue.
2. Select required format.
3. Press "OK“ to confirm the choice.
   ⇨ The prescription map will be loaded.

⇨ The "Prescription maps" screen will appear.

10.5.3 Deleting prescription map formats

Procedure

You can delete a format as follows:

☑ The "Prescription maps" screen has been called up.

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1. Press "Format".
   ⇨ The "Formats" screen will appear.
2. Press "Format".
   ⇨ The line with the format name will be marked in blue.
3. - Select the format you want to delete.
4. Confirm your choice.
5. - Press to delete selected format.
   ⇨ The following message will appear: "Do you really want to delete this format?"
6. - Confirm.

⇨ The format will be deleted.

10.6 Adjusting prescription maps to current needs

After importing the prescription map, you can change the following:

- All values by certain percentage points.
- Selected values by an absolute number.

Procedure

This is how you change all values at once:

☑ You have chosen a prescription map.

☑ The "Prescription maps" screen has been called up.

☑ You can see a prescription map on the screen.

1. Press "All %“ to change all doses.
   ⇨ The data input screen appears.
2. Enter by how many percentage points all doses shall be changed.
3. Press "OK“ to confirm the input.
   ⇨ The "Prescription maps" screen will appear.

⇨ In the "Rate" column, all values will be adjusted by the percentage points entered.

Procedure

This is how you change a selected value:

☑ You have chosen a prescription map.

☑ The "Prescription maps" screen has been called up.

☑ You can see a prescription map on the screen.

1. - Turn the rotary button.
   ⇨ In the "Rate" column, a blue frame marking a cell appears.
2. - Mark the dose to be changed.
3. Press "Rate +-".
   ⇨ The data input screen will appear.
4. Input a new value.

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5. Press "OK“ to confirm the input.
   ⇨ The "Prescription maps" screen will appear.

⇨ The new value appears in the cell you have changed.

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11 TRACK-Leader TOP automatic steering

WARNING

- Read the enclosed "PSR ISO TOP" directions for use before beginning to use the system. Pay particular attention to the information in the Chapter "Safety".
- Proceed with extreme care, particularly when using the automatic steering!
- Disable the automatic steering whenever anyone comes within 50 meters of the vehicle or farming device while it is operating.

Controls

All function icons that you need for automatic steering control are displayed directly on the screen.

Function icon	Alternative function icon	Description
		TRACK-Leader TOP automatic steering is deactivated or unavailable.
		The steering job computer is mounted and configured, but an error has occurred. Check the error message in the PSR application.
		Activate automatic steering. The automatic steering can be activated, but is not yet active.
		Deactivate automatic steering. The automatic steering is active.
		Steer vehicle to the left. The function key does not operate when TRACK-Leader TOP is deactivated.
		Steer vehicle to the right. The function key does not operate when TRACK-Leader TOP is deactivated.

11.1 Driver tasks

The driver must perform the following tasks:

- The driver must pay attention to safety. The automatic steering system is blind. It cannot tell if anyone is approaching the vehicle. It cannot stop or take evasive action.
- The driver must brake and accelerate.
- The driver must perform turning.

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11.2 Activating and deactivating automatic steering

WARNING

Risk of traffic accident
If automatic steering is ON, the vehicle may drive off the road and cause an accident. This may lead to human injury, or even fatalities.

- Disable the automatic steering before traveling on public roads.
- Move the steering motor away from the steering wheel.

The automatic steering does not operate in the following cases:

- In "Circle" guidance mode;
- When guidance lines in the headland are activated.

You will need to steer the vehicle manually in these situations.

Procedure

You can activate automatic steering as follows:

☑ You must have configured the steering job computer and TRACK-Leader TOP.

☑ You must have laid out the guidance lines.

☑ You must have positioned the vehicle on a line of travel, and enabled a guidance line.

☑ The function icon appears in the work screen

1. Move the steering wheel motor to the steering wheel. (only for systems with a steering wheel motor.)
2.

- Press.
   ⇨ The function icon

is replaced with the following function icon:

   ⇨ The automatic steering is enabled.
3. When driving in the vehicle, the steering wheel motor controls the vehicle in such a way that it proceeds along the active guidance line.

Procedure

The are several ways of disabling the automatic steering:

1. Move the steering wheel.
   or:

   - Press.
   ⇨ The automatic steering will be disabled.

⇨ The function icon

is replaced with the following function icon:

11.3 Moving guidance lines

The automatic steering drives the vehicle along the active guidance line.

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If the guidance line activated no longer matches the real position of the vehicle due to a GPS signal drift, you can manually move the guidance line.

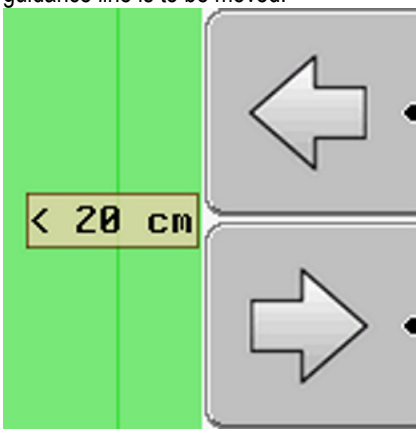
You have two options:

- You can move the guidance line for one drive over the field. After turning, the old position will be restored.
- You can move the guidance line permanently.

Procedure

This is how you move the guidance line for one drive:

☑ The function icon appears in the work screen

1. or press to drive the vehicle in parallel with the activated guidance line.
   ⇨ Next to the function icons, information is displayed about how far and in which direction the guidance line is to be moved:
   

   ⇨ The vehicle will be steered.
2. The vehicle will drive parallel to the guidance line until another guidance line is activated.

Procedure

This is how you will move the guidance line permanently:

☑ You have now started a navigation

1. - Press.
2. - Keep pressed for three seconds to move the guidance lines to the current position.

⇨ The guidance line is then shifted.

11.4 Turning

When turning, the driver must take control of the steering and steer himself.

Procedure

You can make a turn as follows when automatic steering is enabled:

☑ The work screen displays the function icon:

. The automatic steering is enabled.

1. Take hold of the steering wheel and perform the turning yourself.
   ⇨ The automatic steering is disabled automatically as soon as the steering wheel is moved.

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⇨ The function icon

is replaced with the following function icon:

2. Turning.

⇨ The next guidance line is then activated if the angle between itself and the vehicle is smaller than the set "Line acquisition angle" parameter.

3.

- Activate the steering until the next guidance line is activated.

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12 Cooperation with other applications

12.1 Cooperation with the ISOBUS-TC application

You can use TRACK-Leader together with the ISOBUS-TC application.

Advantages

- You do not need to load or import any field data with TRACK-Leader. If you start a task in ISOBUS-TC, all field data will be directly transferred to TRACK-Leader.
- You can work by using prescription maps integrated in a task.

Important

In order to use both programs, please note the following:

1. Always start the task in the ISOBUS-TC application when working with TRACK-Leader.

Activating and deactivating cooperation with ISOBUS-TC

If you do not want to use the ISOBUS-TC application, deactivate the processing of ISO-XML tasks:

1. Open the ISOBUS-TC application.
2. Open the "Settings" screen.

3. Configure the "Work with ISO-XML?" parameter.
4. Restart the terminal.

12.2 Cooperation with job computers

When an ISOBUS job computer is connected to the terminal, you can use all TRACK-Leader apps.

In this case, TRACK-Leader takes all parameters of the connected agricultural device from the ISOBUS job computer.

For example:

- Work width
- No. of sections
- Geometry of agricultural device

The job computer receives this information from TRACK-Leader:

- Commands to switch on/off sections (SECTION-Control)
- Spread rates (VRC)

12.3 Cooperation with TRACK-Guide Desktop

TRACK-Guide Desktop is a free program for PCs.

This allows you to:

- View work results
- Print reports for your customers

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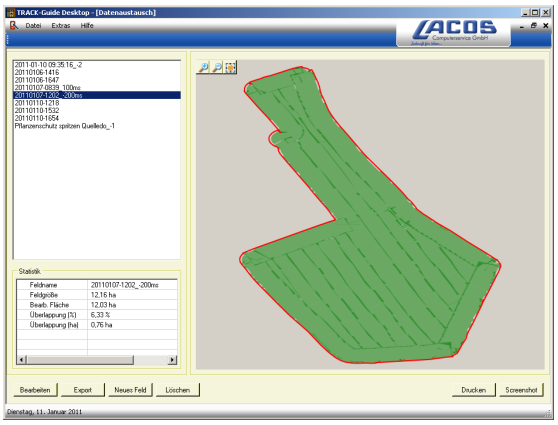
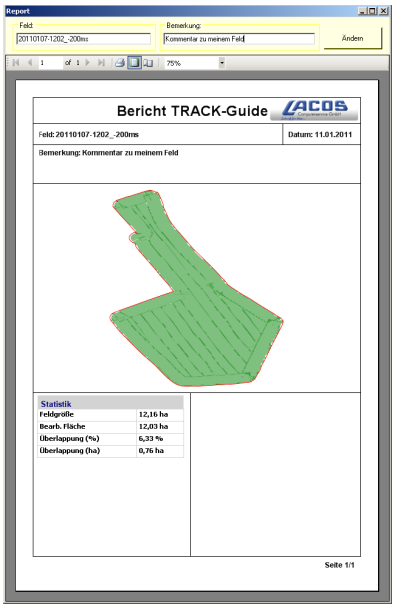


Program window



Report

You can find TRACK-Guide Desktop in the "Download" section of the website below: www.lacos.de

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13 Configuration

This chapter clarifies all settings which you have to configure.

All configuration parameters can be found in the "Settings" screen. These are divided into the following groups:

- General - Parameters which affect all of the TRACK-Leader modules.
- TRACK-Leader - Parameters with which you can configure the parallel route. They are therefore required for all modules.
- SECTION-Control - Parameters which are used for automatic section switching.
- TRACK-Leader TOP - Parameters for TRACK-Leader TOP automatic steering
- Machine profiles - Saved profiles for machines and vehicles in your fleet.

One of the groups is always grayed out: "SECTION-Control" or "Machine profiles". Which one this is depends on how you configure the "SECTION-Control" parameter in the "General" group.

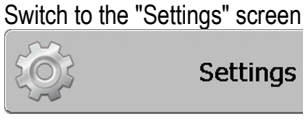
You have to configure the following

Module	Chapter
TRACK-Leader	Configuring "General" settings [➞ 63] Configuring TRACK-Leader [➞ 64]
SECTION-Control	Configuring "General" settings [➞ 63] Configuring TRACK-Leader [➞ 64] Configuring SECTION-Control [➞ 65]
TRACK-Leader TOP	Configuring "General" settings [➞ 63] Configuring TRACK-Leader [➞ 64] Configuring TRACK-Leader TOP [➞ 75]
VARIABLE RATE-Control	No additional settings are needed

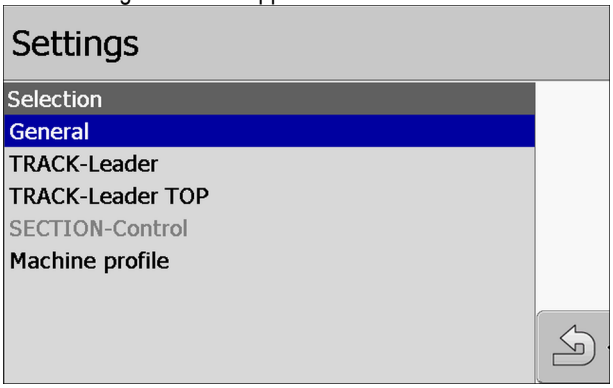
Procedure

This is how you open the configuration screens:

1. Switch to the "Settings" screen



⇨ The following screen will appear:



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2. Click on the line with the desired application.

⇨ A list of parameters appears.

The following sub-chapters provide an explanation of these parameters.

13.1 Configuring "General" settings

In this menu you can set the display on the screen and activate some functions.

SECTION-Control

This parameter determines whether automatic section switching is activated or deactivated.

When a task is started in ISOBUS-TC, this parameter cannot be changed.

Potential values:

- "Yes"
  SECTION-Control is activated. Machine data such as work width are automatically transferred from the connected job computer.
  Prerequisite: An ISOBUS job computer must be connected.
- "No"
  SECTION-Control is deactivated. Only the parallel guidance TRACK-Leader is activated.
  When no ISOBUS job computer is connected, you must create a profile for each machine. See: Machine profiles [➙ 77]

Acoustic warnings

This parameter determines whether a warning tone sounds when in the vicinity of field boundaries and recorded obstacles.

Potential values:

- "Yes"
- "No"

Trace transparency

This parameter determines whether and how overlaps are displayed on the screen.

Potential values:

- "0"
  Overlaps are not displayed.
- "1" – "6"
  Intensity of colors with which overlaps are marked.
- "3"
  Default

Show grid

Displays a grid on the navigation screen.

The distances between the grid lines will differ according to the input work width. The grid lines are aligned along the North-South and East-West axes.

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Map orientation

This parameter defines what rotates when steering is applied.

Potential values:

- "Vehicle fixed"
  The vehicle icon on the terminal screen remains immobile.
- "Field fixed"
  The vehicle icon on the terminal screen moves. The background map remains immobile.

Smoothen course

If the GPS receiver mounted on the roof of the tractor cab swings sharply, the driving route displayed on the screen can appear very jagged.

The "Smoothen course" option smoothens out the displayed driving route.

The requirements in this user guide are only applicable when using a A100 GPS receiver. Other settings may be correct when using other GPS receiver.

Potential values:

- "Yes"
  When you are using TRACK-Leader TOP and the A100 GPS receiver is connected to the steering job computer.
- "No"
  When you are not using TRACK-Leader TOP and the GPS receiver is connected to the terminal.

Run demo mode

Starts a simulation of the application.

13.2 Configuring TRACK-Leader

Guidance line numbering

This parameter determines whether and how the implemented guidance lines are numbered.

Potential values:

- "absolute"
  The guidance lines have fixed numbers. The AB line contains the number 0. The guidance lines to the left and right of the AB line will be numbered.
- "relative"
  The guidance lines are re-numbered each time that the vehicle activates a new guidance line. The activated guidance line always has the number 0.

Sensitivity

Sets the sensitivity of the light bar.

How many centimeters of deviation are required for a LED to light on the light bar?

- Default: 30cm
  This value means a sensitivity of 15cm to the left and 15 cm to the right.

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Preview

This parameter determines the number of meter in front of the vehicle at which the preview display of the screen light bar will calculate the future position of the vehicle.

- Default: 8m

See also: The screen light bar in graphic mode [➞ 23]

Line acquisition angle

The program assumes from a defined angle that the vehicle wants to swing to a guidance line. This guidance line will be then marked in blue. If the vehicle drives with smaller angle deviation towards a guidance line, then this track will not be recognized as a new current guidance line.

- Default: 30 degrees
- Value for TRACK-Leader TOP: 85 degrees

Dist. contour points

Points are continuously saved when recording the AB line in contour mode. The more the points, the more precise the drawn guidance line. This does however slow down the operation of the terminal.

The parameter defines the distance between the points. The optimal value can differ per field, and per vehicle.

- Default: 500 cm

13.3 Configuring SECTION-Control

In this configuration step, you will configure the section switching for your ISOBUS job computer.

The application recognizes every ISOBUS job computer by means of its ISO-ID and sets up an individual profile for each of these. You can therefore configure different parameters for your fertilizer applicator and for your seeder or sprayer.

Procedure

☑ The "SECTION-Control" parameter in the "General" menu is activated.

1. To switch to the "SECTION-Control" screen:

   | SECTION-Control
   ⇨ A list of profiles of ISOBUS job computers which may potentially be connected to the terminal is shown. A new profile will be created whenever you connect a new ISOBUS job computer to the terminal.
2. - Use the rotary knob to click on the ISOBUS job computer for which you want to configure SECTION-Control. The connected job computer is marked with a green point.
   ⇨ A lists of the set parameters appears.
3. Set the parameter. You will find explanations of these on the following pages.

Parameters for SECTION-Control

Degree of overlap

The degree of overlap when applying the product in a wedge-shaped area.

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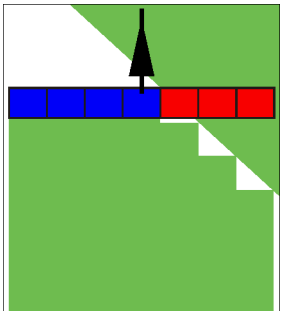
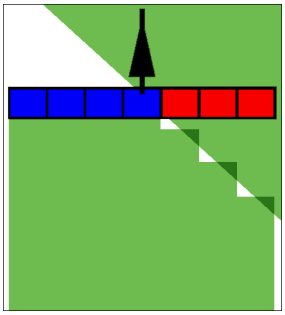
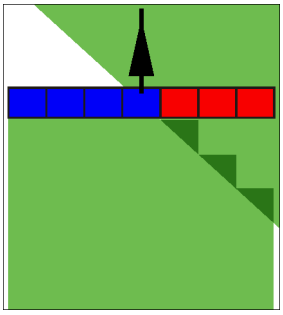
The set "Degree of overlap" is influenced at the outer sections by means of the "Tolerance of overlap" parameter.



0% degree of overlap



50% degree of overlap



100% degree of overlap

Potential values:

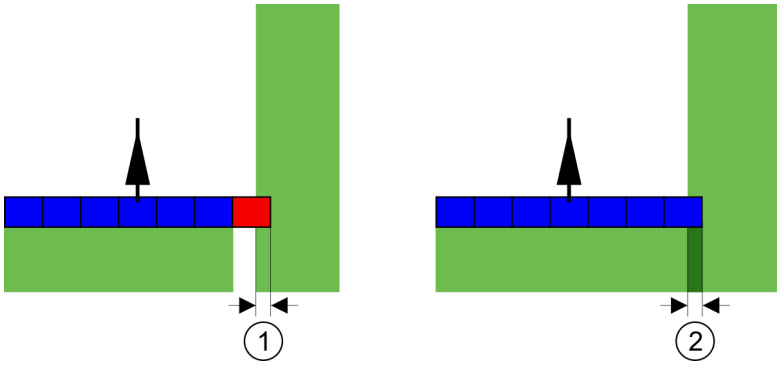
- 0% – Each section is only switched on when exiting an area where the product has been applied, when the vehicle has completely exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 1% over the treated surface.
- 50% – Each section is only switched on when exiting an area where the product has been applied, when 50% of the vehicle has exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 50% over the treated surface. At a "Degree of overlap" of 50%, the "Tolerance of overlap" function has no effect.
- 100% – Each section is only switched on when exiting an area where the product has been applied, when 1% of the vehicle has exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 100% over the treated surface.

Tolerance of overlap

Use this parameter to define a permissible overlap. The outer sections are only activated when the overlap is greater than the value of this parameter.

The "Tolerance of overlap" only applies to the outermost left and right sections. No other sections are affected by this parameter.

The following illustrations show how the "Tolerance of overlap" parameter works with a "Degree of overlap" of 0%. The set tolerance of overlap can be seen underneath the illustrations.



Tolerance of overlap for 0% degree of overlap – in both cases the work was done with a 25cm overlap.

1	Tolerance of overlap 0cm In this case, the section is immediately switched off.	2	Tolerance of overlap 30cm In this case, the section is not switched off, as the current overlap is lower than 30cm.

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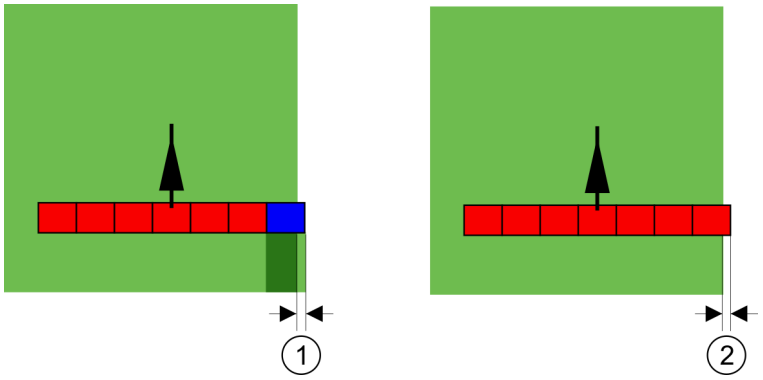
If you have set the "Degree of overlap" parameter to 100%, the "Tolerance of overlap" parameter plays a vital role when leaving an area already processed. This is relevant for example when turning in headland which has already been processed.



Tolerance of overlap for 100% degree of overlap – in both cases the area processed was skipped by 25cm.

1	Tolerance of overlap 0 If only 1% of the section skips the area which has already been processed, the entire section will be switched on.	2	Tolerance of overlap 30cm The tolerance of overlap enables avoiding unnecessary overlaps. The right tolerance is only switched on when more than 30cm of processed area is skipped.

Potential values:

- **Recommendation** Set the "Tolerance of overlap" to 30cm when using the A100 GPS receiver.
- Tolerance 0cm
  The outermost section is switched on or off when entered or exited by the track being travelled.
- Other values
  The outermost section is switched on or off when the overlap exceeds the value.
- Maximum value
  Half of the section width of the outermost section.

Field boundary overlap tolerance

Use this parameter to prevent sections from being activated at the field boundary in the event of a minimum overlap.

This parameter functions in the same way as "Tolerance of overlap", but is only applied when the field boundary is exceeded.

Before making any change to this distance, make sure that this is safe for the environment and the surroundings under current circumstances.

Overlapping nozzles (EDS)

This parameter is only applicable to sprayers with an individual nozzle switching function. This is not even displayed on other systems.

Use the parameter to set the number of nozzles which should operate in overlapping mode.

Delay

Delay is the period of time which elapses from the transmission of an order by the job computer and the implementation of the order by the machine.

This time differs for each machine.

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There are two parameters for the configuration:

- "Delay on start" (when switching on)
- "Delay on stop" (when switching off)

If you have an ISOBUS job computer which transfers delay times to SECTION-Control, you must not change these parameters. In this case, the text "ISO" will appear a value.

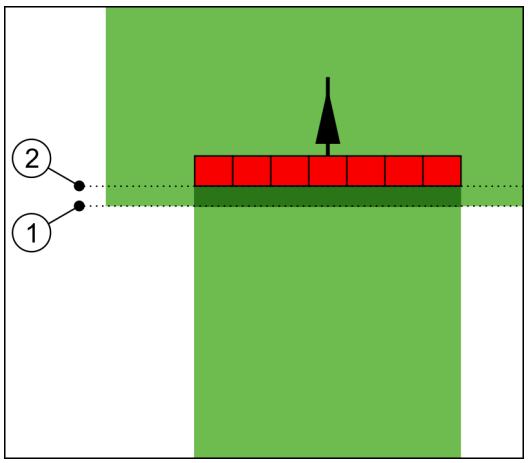
Example

When a section passes over a surface where the product has been already applied during spraying, this must be immediately switched off. To do this, the software sends a signal to the section valve to switch off. As a result, the pressure in the section valve is shut off. This lasts until there is no further flow from the nozzles. The duration is approx. 400 milliseconds.

The result is that the section applies an overlap for a length of 400 milliseconds.

In order to prevent this, the "Delay on stop" parameter must be set to 400 ms. Now, the signal is sent to the section valve 400 milliseconds earlier. As a result, the application can be interrupted or restarted at exactly the right point in time.

The illustration below shows how the delay function works. The illustration shows actual behavior, not the indication on the screen.



Delay on stop is set to 0. A too brief delay time results in overlapping application.

1	At this point, the section valve receives a signal to shut off.	2	At this point, the sprayer stops application.

Potential values:

- "Delay on start"
  Enter the delay when switching a section on.
  e.g.
  - 400 ms solenoid valve
  - 1200 ms electrically actuated valve
- "Delay on stop"
  Enter the delay when switching a section off.
  e.g.
  - 300 ms solenoid valve
  - 1200 ms electrically actuated valve

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Machine model

This parameter determines the way and means in which the working bar should track the GPS receiver.

Potential values:
- "self propelled"
  Settings for self-propelled agricultural equipment.
- "trailed"
  Settings for agricultural equipment towed by a tractor.
- "deactivated"
  Settings for attached devices.

Screen light bar

Screen light bar type.

Potential values:
- "Deactivated"
  Deactivates the screen light bar
- "Graphic Mode"
  Activates screen light bar in graphic mode
- "Textmode"
  Activates screen light bar in text mode
- "SECTION-View"
  Activates SECTION-View

13.3.1 Calibrating Delay on start and Delay on stop

This chapter is intended for advanced users.

Before reading the chapter:
- Learn how to operate the terminal.
- Learn how to operate the SECTION-Control.

The standard values of parameters "Delay on start" and "Delay on stop" are set for work with most sprayers.

When should you calibrate?

These parameters must be calibrated in the following cases:
- If using a different agricultural device with SECTION-Control.
- If the agricultural device switches too late or too early when driving on an area where the product has been already applied.
- If the agricultural device switches too late or too early when leaving an area already where the product has been already applied.

In the chapters below you will learn how to calibrate the parameters.

The chapters and examples apply to the example of a sprayer. For different agricultural devices, please proceed accordingly.

Calibration phases

Calibration consists of several phases:

1. Calibration preparations
2. Traveling the field for the first time

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3. Traveling the field for the second time
4. Marking the application borders
5. Calculating correction values
6. Correcting the "Delay on start" and "Delay on stop" parameters

The phases are explained in detail in the following chapters.

Calibration preparations

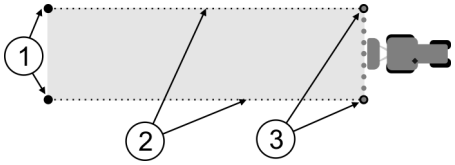
You will need the following equipment and personnel in order to perform the calibration:

- Two observers – two people who will mark the areas where the product has been already applied with stakes.
- Tools for marking the areas where the product has been applied:
  - Barrier tape, approx. 200 - 300m
  - 8 stakes for marking on the field
- Sprayer with tank loaded with clean water.

First travel

In this phase of the calibration, you will need to travel across the field along a single track.

The illustration below shows the points which must be marked before and after the travel. Instructions on how to do this are given beneath the illustration.



Results of the first travel

1	**Stakes** To mark the outer ends of the sections prior to travel	3	**Stakes** To mark the outer ends of the sections after travel
2	**Barrier tape between the stakes** To mark the borders of travel		

Procedure

To prepare the field for delay calibration:

1. Start a new navigation with SECTION-Control.
2. Position the sprayer at the start of the travel. The travel must not be positioned close to the field boundary, in order to give you sufficient space for the second travel.
3. Extend the boom.
4. Mark the ends of the outer sections with stakes.
5. Travel 100 to 200 meter in a straight line before beginning to apply the clean water.
6. After 100 to 200 meter, stop and switch off the sprayer.
7. Save the travel in the TRACK-Leader. This will enable the calibration to be repeated.
8. Mark the ends of the outer sections with stakes.
9. Connect the stakes with barrier tape. This marks the borders of travel across the field.
10. Fix the barrier tape to the ground with stones or earth.

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⇨ You have now performed the first travel, and marked the application borders.

Second travel

In this phase, you will need to apply the product over the area which you traveled through in the first travel at a 90° angle.

CAUTION

Injury from the driving sprayer

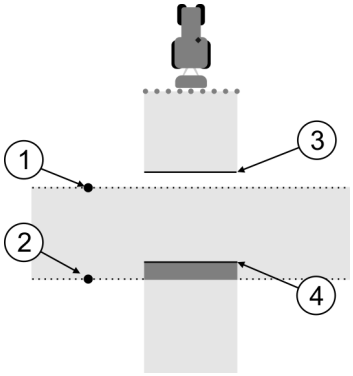
Observers who are assisting with the calibration are at risk of being struck by the boom.

- The observers should be made properly aware of this risk. Such hazards should be explained to them.
- Ensure that the observers maintain a sufficient distance from the spray boom at all times.
- Stop the sprayer immediately if an observer is too close to the sprayer.

In this phase, you will require the help of one or two more people. These people will observe the travel and the behavior of the sprayer, and mark out the application borders.

They should be appropriately trained and warned of the potential dangers.

The illustration below shows where the observers must stand and the objectives that they must achieve.



Travel 2

1	Position of Observer 1	3	This line marks the position at which the nozzles should begin spraying when the vehicle exits the area where the product has been applied.
2	Position of Observer 2	4	This line marks the position at which the nozzles should stop spraying when the vehicle enters the area where the product has been applied.

Procedure

☑ The tank is filled with clear water.

☑ The observers should stand at a safe distance from the boom of the sprayer.

☑ Navigation is started using the first travel.

☑ SECTION-Control should be in automatic mode.

1. Position the sprayer at a distance of approx. 100 meter from, and an angle of 90° to the traveled area.

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2. Drive at a constant speed (e.g.: 8 km/h) over the area where the product has been already applied. Apply the water as you do so.
3. The observers must stand on the previously marked travel borders at a safe distance from the boom.
4. The observers must observe the points at which the sprayer stops and starts spraying, as it passes along the already traveled points.

⇨ You will now know how the sprayer behaves when traveling along an area where the product has been already applied.

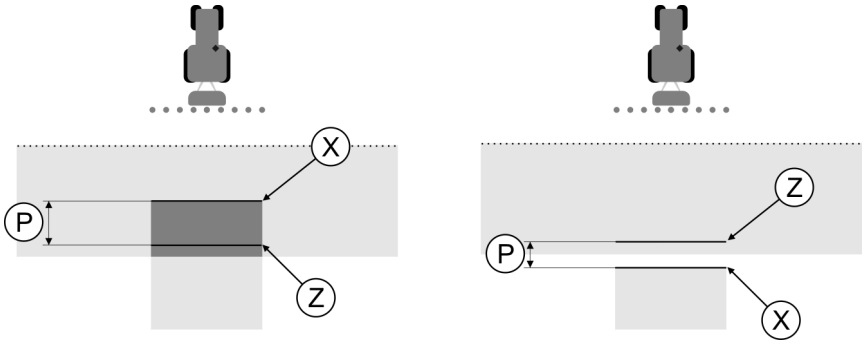
You may wish to repeat this process several times in order to ensure better accuracy of the results.

Marking the application borders – for Delay on stop

In this phase, you will need to mark where your sprayer stops application when you enter an area where the product has been already applied. You must also determine where application should stop in future.

This will tell you whether the sprayer is switching off too early, or too late.

The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on stop" parameter.



Lines for the "Delay on stop" parameter. Left: Sprayer switches off too late. Right: Sprayer switches off too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer stops application.
		Z	Desired application line This is where the sprayer should stop application. A slight overlap of 10cm should be planned due to the pressure release time.

In both cases (left and right), the "Delay on stop" parameter is incorrectly set:
- Left: Sprayer switches off too late. The delay period must be extended.
- Right: Sprayer switches off too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

⇨ You now know whether the sprayer is switching off too early, or too late.

Marking the application borders – for Delay on start

In this phase, you will need to mark where your sprayer begins application when you exit and where the product has been already applied. You must also determine where application should begin in future.

This will tell you whether the sprayer is switching on too early, or too late.

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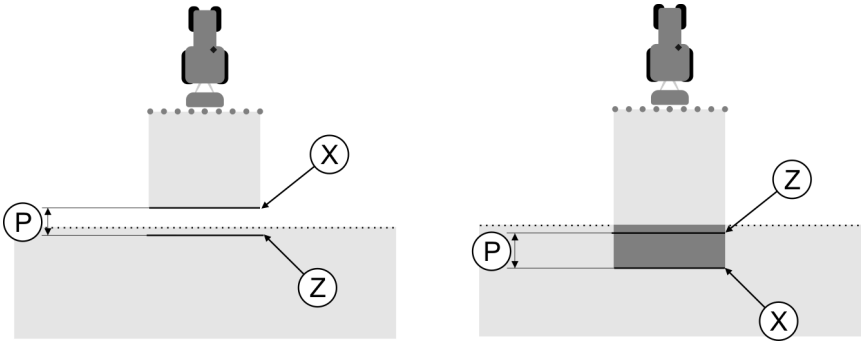
The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on start" parameter.



Lines for the "Delay on start" parameter. Left: Sprayer switches on too late. Right: Sprayer switches on too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer begins application.
		Z	Desired application line This is where the sprayer should begin application. A slight overlap of 10cm should be planned due to the pressure build-up time.

In both cases (left and right), the "Delay on start" parameter is incorrectly set:

- Left: Sprayer switches on too late. The delay period must be extended.
- Right: Sprayer switches on too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

⇨ You now know whether the sprayer is switching on too early, or too late.

Calculating correction values

In the final phase, you have determined:

- Which parameters must be altered.
- Whether the current delay must be increased or reduced.

You must now calculate the number of milliseconds by which to adjust the incorrectly set parameter.

To do this, you will need to calculate a so-called correction value.

In order to be able to calculate the correction value, you need to find out how fast the sprayer was travelling. This speed must be entered in inch/milliseconds.

The following tables lists a number of speeds and their conversion into cm/ms:

Speed in km/h	Speed in cm/ms
6 km/h	0.16 cm/ms
8 km/h	0.22 cm/ms
10 km/ h	0.28 cm/ms

Procedure

The correction value should be calculated as follows:

1. **[Distance P] : [Speed of sprayer] = Correction value**
2. The currently set "Delay on start" or "Delay on stop" parameter must then be corrected by this value.

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Changing the delay parameter

You must now adjust the "Delay on start" and 'Delay on stop" parameters.

Procedure

1. Alter the parameters using the following rule of thumb:
   - If the sprayer switches on too late, it needs more time. The delay period must be extended.
   - If the sprayer switches on too soon, it needs less time. The delay period must be reduced.
2. Calculate a new value for the delay parameter.
   Perform this step separately for the "Delay on start" or "Delay on stop"
   If the sprayer switches on or off too late:
   Extend the current delay period by the correction value
   If the sprayer switches on or off too early:
   Reduce the current delay period by the correction value

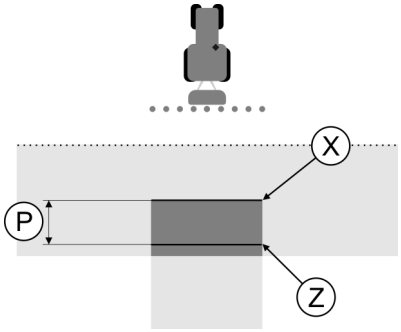
Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

The sprayer was switched off too late when traveling over an area where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:



When travelling over the area where the product has been already applied, the sprayer switched off too late

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay parameter.
   As the sprayer switches off too late, "Delay on stop" must be increased by the correction value:
   364 (correction value) + 450 (set "Delay on stop") = 814 (new "Delay on stop")
3. Insert value 814 for the "Delay on stop" parameter.

Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

The sprayer switched off too early when traveling over an are where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:

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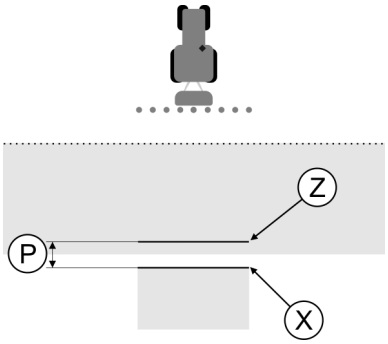

When traveling over an area where the product has been already applied, the sprayer switched off too early.

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay on stop parameter.
   As the sprayer switches on or off too early, "Delay on stop" must be decreased by the correction value:
   450 (set "Delay on stop") - 364 (correction value) = 86 (new "Delay on stop")
3. Insert value 86 for the "Delay on stop" parameter.

13.4 Configuring TRACK-Leader TOP

The following parameters must be set in order to use TRACK-Leader TOP:

GPS receiver height

Distance between GPS receiver and the ground.

Required for: TRACK-Leader TOP

Implement offset

You have to enter the machine offset when the agricultural machine, as shown in the picture, works with an offset on one side. Should this parameter be missing, some areas will be processed twice and some skipped.

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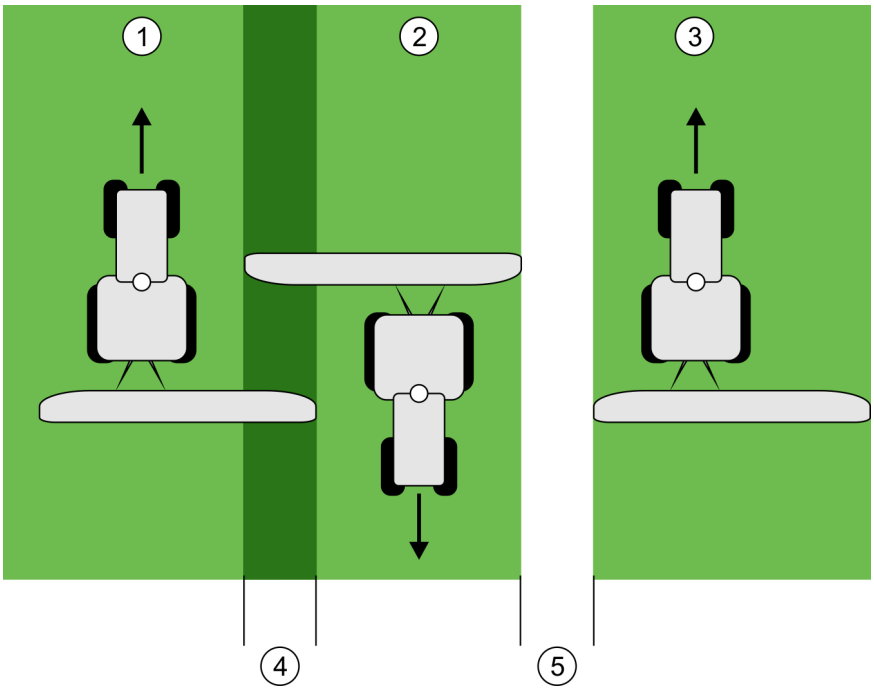

Work with machine offset, without setting the "Implement offset" parameter

1	First travel	4	Double-processed area
2	Second travel	5	Unworked area
3	Third travel		

Mode of operation

If this parameter is allocated any value other than 0, the following occurs:

- A red guidance line appears on the work screen. TRACK-Leader TOP will follow the red guidance line.
- The machine icon and the boom icon are shifted to the input value.

Potential values:

- Input a positive value, e.g.: **90cm**
  If the towed equipment is offset to the right.
- Input a negative value, e.g.: **-90cm**
  If the towed equipment is offset to the left.
- Input "0"
  After connecting a job computer in which the entire geometry of the towed equipment is recorded. For example the job computer of a sprayer from Müller-Elektronik.

Procedure

This is how you determine the right value for this parameter:

1. Ensure that the parameter is set to "0".
2. Start new navigation with TRACK-Leader.
3. Drive your tractor three swaths along the guidance lines, as shown in the image above.
4. Measure the width of the unprocessed area between the second and third drive.
5. Enter the half of the width measured as the value of this parameter.
6. With plus and minus you can set the offset direction for the agricultural machine.

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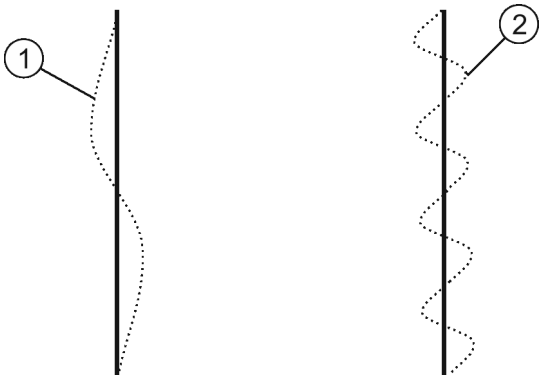
PSR reaction speed

PSR reaction speed and aggressiveness of the automatic steering. The higher the value, the sharper the steering movements.

The aim of these settings is to ensure that the vehicle finds the track fast enough, but still drives calmly and does not over-steer constantly.

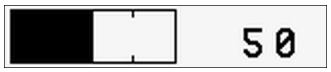


Examples of different PSR reaction speeds

1	The steering responds too slowly	2	The steering responds too rapidly

You can adjust the value to specific local conditions prior to work commencement:
- When the ground is wet and makes steering more difficult, increase the value.
- When the ground is dry and makes steering easy, reduce the value.

The value set here will also appear in the start screen of the PSR application (steering job computer):



13.5 Machine profiles

Each machine for which you use the software can have different parameters. You can create profiles for machine settings, so that you avoid setting the parameters every time you start your work.

In the "Machine profiles" area you can enter the parameters of connected agricultural devices and save them as profiles.

You will need the machine data in the following instances:
- When SECTION-Control is deactivated
- When the terminal is not connected to any job computer.

13.5.1 Creating new machine profiles

"Machine" here means a combination of a tractor and an agricultural device.

Example

If you have two tractors and two devices in your fleet, you possibly have to create four profiles:
- Tractor A and sprayer
- Tractor B and sprayer
- Tractor A and fertilizer spreader
- Tractor B and fertilizer spreader

Always create all combinations which you actually need as machine profiles. You can save up to 20 machine profiles.

Procedure

☑ The "SECTION-Control" parameter in the "General" menu is deactivated.

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1. To switch to the "Machine profiles" screen:

   | Machine profiles
2. - Click on "Create new profile".
   ⇨ The data input screen will appear.
3. Enter the designation of the new machine profile.
4. - Confirm input and save.
   ⇨ The "Machine profiles" screen will appear.
5. Set machine parameters.

13.5.2 Selecting from machine profiles

Before you start work, you have to select the machine from your fleet. You select the machine from the machine profiles.

Procedure

1. To switch to the "Present machine profile" screen:

   | Machine profiles | Present machine profile
   ⇨ The "Present machine profile" screen will appear. In this screen all machine profiles you have saved are listed.
   ⇨ The activated machine profile is marked with a green point.
2. - Click on required machine profile.
   ⇨ The "Machine profiles" screen will appear.
3. Check machine parameters.
4. - Leave the screen as soon as the parameters are the current ones.
   ⇨ The required machine profile will be activated.

⇨ The name of the machine profile activated appears on the starting screen on line "Machine".

13.5.3 Machine parameters

You will need the machine parameters in the following instances:

- When you want to create a machine profile for a new machine
- When you want to edit a machine profile

On the pages below you will find the explanation of all machine parameters.

Swathwidth

This parameter shows the work width set for a device.

No. of sections

Input the number of sections.

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Each section appears as part of the working bar on the screen.

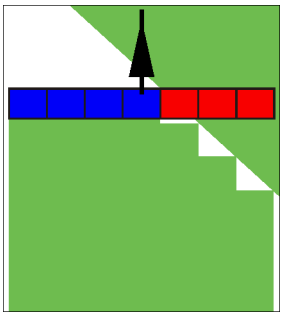
Sections

Opens a screen on which you can input the width of the individual sections.

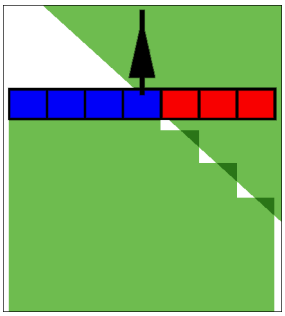
Degree of overlap

The degree of overlap when applying the product in a wedge-shaped area.

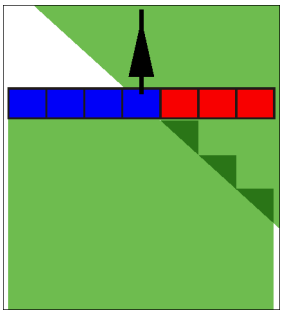
The set "Degree of overlap" is influenced at the outer sections by means of the "Tolerance of overlap" parameter.



0% degree of overlap



50% degree of overlap



100% degree of overlap

Potential values:

- 0% – Each section is only switched on when exiting an area where the product has been applied, when the vehicle has completely exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 1% over the treated surface.
- 50% – Each section is only switched on when exiting an area where the product has been applied, when 50% of the vehicle has exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 50% over the treated surface. At a "Degree of overlap" of 50%, the "Tolerance of overlap" function has no effect.
- 100% – Each section is only switched on when exiting an area where the product has been applied, when 1% of the vehicle has exited the area. When travelling across a surface where the product has been applied, the section is first switched off when the section extends up to 100% over the treated surface.

GPS receiver left/right

In the event that the GPS receiver is not positioned on the longitudinal axis of the vehicle, this offset must be set here.

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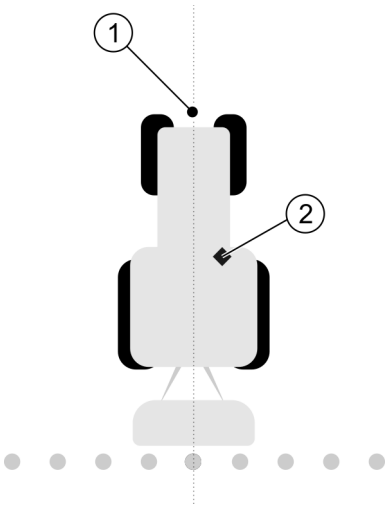


Longitudinal axis of the vehicle and GPS receiver

1	**Longitudinal axis of the vehicle**	2	**GPS receiver** To the right of the longitudinal axis of the vehicle

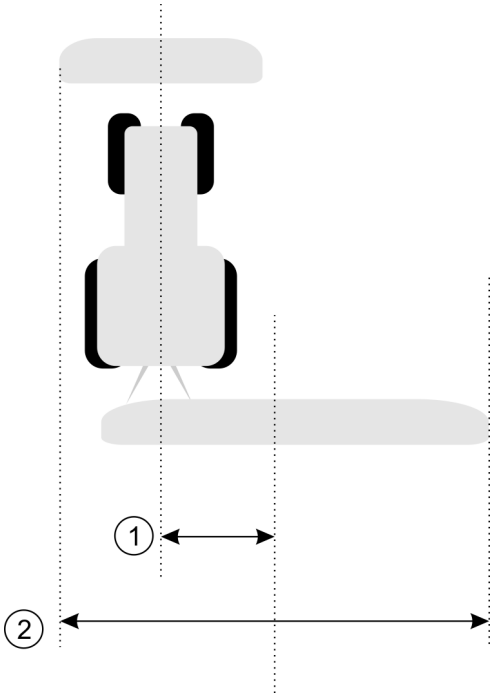
Potential values:

- Input a negative value, e.g.: **- 0.20m**
  if the GPS receiver is positioned to the left of the longitudinal axis.
- Input a positive value, e.g.: **0.20m**
  If the GPS receiver is positioned to the right of the longitudinal axis.

GPS receiver left/right for asymmetric equipment

If using an asymmetric agricultural device, the center of the work width is in a different position than for symmetric devices.

In order to compensate for this difference, you have to adjust the "GPS antenna left/right" parameter set before.



Asymmetric device

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(1)	Distance between the longitudinal axis of the tractor and the center of the work width. The center of the agricultural device will be changed by this distance.	(2)	Total work width

Procedure

This is how you modify the "GPS antenna left/right" parameter for asymmetric device:

1. Measure the entire work width.
2. Determine the exact center of the work width.
3. Measure the distance between the center of the work width and the longitudinal axis of the tractor.
4. Adjust the value of the parameter:
   - If the center of the work width is moved to the right, add the distance measured to the value of this parameter.
   - If the center of the work width is moved to the left, deduct the distance measured from the value of this parameter.

GPS receiver front/rear

Distance of the GPS receiver from the treatment point. The treatment point may for example be the boom of a sprayer. For a fertilizer applicator, this is the spreader discs.

Potential values:

- Input a negative value, e.g.: **- 4.00m**
  if the GPS receiver is positioned to the rear of the treatment point.
- Input a positive value, e.g.: **4.00m**
  if the GPS receiver is positioned in front of the treatment point.

Operating position sensor

Is a tool operating position sensor mounted on the vehicle?

The tool operating position sensor is a sensor which recognizes that an agricultural device is set and delivers this information to the terminal. The sensor is available for many tractors and can be reached via the signal socket.

Potential values:

- "Yes"
- "No"

Inverted sensor logic

Is the sensor logic of the tool operating position sensor inverted?

- "Yes" – Product application recording begins when the tool operating position sensor is not occupied. This will end when the operating position sensor has been occupied.
- "No" – Product application recording begins when the tool operating position sensor is occupied. This will end when the operating position sensor is no longer occupied.

Machine model

This parameter determines the way and means in which the working bar should track the GPS receiver.

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Potential values:
- "self propelled"
  Settings for self-propelled agricultural equipment.
- "trailed"
  Settings for agricultural equipment towed by a tractor.
- "deactivated"
  Settings for attached devices.

Screen light bar

Screen light bar type.

Potential values:
- "Deactivated"
  Deactivates the screen light bar
- "Graphic Mode"
  Activates screen light bar in graphic mode
- "Textmode"
  Activates screen light bar in text mode
- "SECTION-View"
  Activates SECTION-View

Implement type

Use this parameter to define the type of agricultural device.

The following implement types are available:
- Sprayer
- Fertilizer
- Planter/Seeder
- Harvester
- Non specific system

Spread pattern for a fertilizer

If you want to ensure precise application when moving on a headland or a treated area, you can specify a spread pattern for your fertilizer.

Use the following parameter to define the spread pattern for a fertilizer:
- "Spreading distance"
  This is the distance between the spreader discs and the center of the spread pattern.
  Spreading distance = (working length/2) + (distance between the switch-off line and spreader discs)
- "Working length"
  Distance between the switch-off line and switch-on line in the spread pattern.

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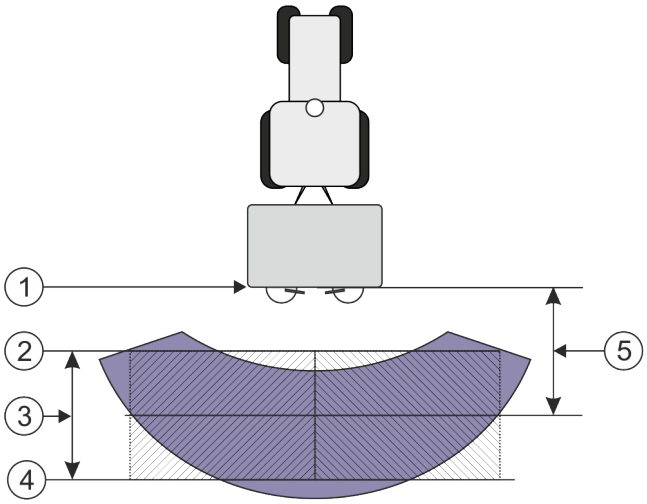

The "spreading distance" and "working length" parameters

1	Spreader discs	4	Switch-on line When this line moves away from the headland, application is resumed.
2	Switch-off line When this line reaches the headland, application is interrupted.	5	Spreading distance
3	Working length Area between the switch-off line and the switch-on line.		

Procedure

You can display the parameter as follows:

1. Set the "Implement type" parameter to "Fertilizer".
   ⇨ The "spreading distance" and "working length" parameters are displayed in the menu.

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14 Procedure for dealing with error messages

Error message text	Possible cause	How to fix the problem
Caution! The memory could not be initialized. If the problem still persists after a restart, please contact the service.	The database could not be created on the USB memory device.	Restart the terminal.
Current profile not removable!	An attempt was made to delete the currently selected vehicle profile.	Select another vehicle profile and then delete the desired machine profile.
An error has occurred while reorganizing the memory.	The USB memory device was removed during reorganizing.	Re-insert the USB memory device and re-start the reorganization
	The USB memory device is full.	Delete unnecessary data from the USB memory device and try again.
	The USB memory device is faulty.	Request a new USB memory device from the manufacturer.
Could not find DGPS configuration file!	The internal file containing the DGPS settings could not be found.	Contact our Service team in order to reinstall the software.
Test phase run off! Please inform your dealer.	Test phase run off!	Request a license. Unlock the software.
No USB stick plugged!		Insert the USB memory device.
Export failed!	The USB memory device was removed before or during the export.	Re-insert the USB memory device and re-start the export.
	Writing is not allowed on the USB memory device.	Disable write protection on the USB memory device.
	The USB memory device is full.	Delete unnecessary data from the USB memory device and try again.
Error!		Contact the Customer service.
GPS is not working!	The serial connection to the GPS antenna has been interrupted. The position can no longer be determined.	Check and re-connect the cable connections to the GPS antenna.
GPS signal too weak!	The GPS signal quality is too weak, most likely due to obstructions.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
No DGPS available!	No DGPS is available due to signal obstruction.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
	No DGPS is available due to a failure of	Check the general availability of the

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Error message text	Possible cause	How to fix the problem
	the correction data service, e.g. EGNOS.	service. Check and set the correct EGNOS correction satellites.
No compatible format found for this application map. Please create a new format.	No suitable format could be found for the application map content. No compatible format has been created.	The major formats have been provided. Other formats can be incorporated by the users themselves.
No profile available!	No vehicle profile is available!	Create a new vehicle profile.
Could not read DGPS configuration from GPS receiver!	The serial connection to the GPS antenna has been interrupted.	Check and re-connect the cable connections to the GPS antenna.
Could not read e-Dif configuration from GPS receiver!	The serial connection to the GPS antenna has been interrupted.	Check and re-connect the cable connections to the GPS antenna.
Could not read data from tilt module!	The serial connection to the GPS TILT module tilt sensor has been interrupted.	Check and re-connect the cable connections.
Backup failed!	The USB memory device was removed before or during the save.	Re-insert the USB memory device and re-start the save process.
	Writing is not allowed on the USB memory device.	Disable write protection on the USB memory device.
	The USB memory device is full.	Delete unnecessary data from the USB memory device and try again.
Invalid status!		Contact the Customer service.

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